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ANKYLOSTOMIASIS AND BILHARZIASIS IN THE MEDITERRANEAN BASIN

(With 4 charts attached to the text).

Translation prepared by:
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I. Ankylostomiasis.

The information on the occurrence of hookworm infections in the Mediterranean basin is very incomplete for some of the countries concerned. There are no recent detailed investigations of Greece and Turkey. A useful summarizing survey was published by W. HEINE (1938) which will be quoted several times in the following study. In Europe only Ankylostoma duodenale occurs. In all cases in which Necator americanus was found in southern Europe it occurred with remigrants from Brazil, etc. Necator does not occur in northern Africa; it is observed south of the Sahara only, in central Africa, where it has its proper origin.

The cause of the considerable hookworm contamination in Egypt, according to KHALIL, (1924) are the ritual ablutions of the Mohammedan religion after defecating and urinating. AUGUSTINE, HELMY and NAZNI (1929) found that the frequency of hookworm infection in upper Egypt is 49 % while in the region of the Nile delta it amounts to 24.5 %. In both parts of the country, however, the number of hookworms found with the various patients, compared with the severity of the disease was said to be astonishingly small. According to these studies among 75 % of the persons contaminated with ankylostoma in upper Egypt less than 20 worms were found, and among only 2 %, 70 worms and more. In lower Egypt 82 % of the patients have less than 20 worms and only 1 % 70 and more. According to recent investigations of SCOTT (1937) 50 % of the rural population of almost the whole of Egypt are carriers of hookworms (see Illustration 1). A lower (20% in the north of the delta) or a higher percentage (in some of the villages as much as 90 %) were observed in single places only. Altogether 5 million persons of the rural population of Egypt numbering 12 million individuals was said to be contaminated with the hookworm.

In Libya the hookworm disease does not seem to occur, as no endemic case was found during the last 20 years (GOETTSCHE 1942). According to PALAZZO (1936), however, there is the possibility that the disease might be imported from Egypt or other African territories. In a certain borderline zone of the Djebel which is located west of Derna and south of Apollonia the annual precipitation amounts to more than 400 mm. and according to other sources of information even to more than 500 mm. per year. The conditions for the occurrence of ankylostomiasis therefore seem to be present here.

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In Tunisia the most important areas of the hookworm are located in the south of the country. The oases of Gafsa, Tozeur, and Nefta are well known as foci. The intensively cultivated, continuously irrigated soil protected from the sun by palms, is fertilized with human excretions. Thus, it offers the most favorable possibilities of development for the larvae of the hookworm. Contamination takes place principally during the cultivation work which is carried through with bare feet. In addition it is made easy by the ritual ablutions of the Mohammedans, by drinking the contaminated water of the irrigation system, and by eating vegetables infected with larvae and fruit sullied with earth, or by eating the earth itself. In Gafsa 200 indigenous persons were examined for intestinal parasites by ESPIE (1937) and it was found that 51 of them (equal to 25 %) were contaminated with hookworm (see Table I).

The same author found among 300 indigenous persons in the coastal town of Gabes 82 persons (equal to 27 %) contaminated with hookworms. Other foci of contamination of minor importance are reported in the literature: These are the island of Djerba, the environments of Sfax, and the peninsula of Cape Bon in the north of the country with the local centers of Menzel bou Zelfa, Hammam el Ghezaz, Beni Khaled, Nabeul, Dar Chaabane, Soliman, and Grombalia (ESPIE 1930, BENYAMINE 1934).

As in the remainder of North Africa foci of contamination were observed in Algeria in various places

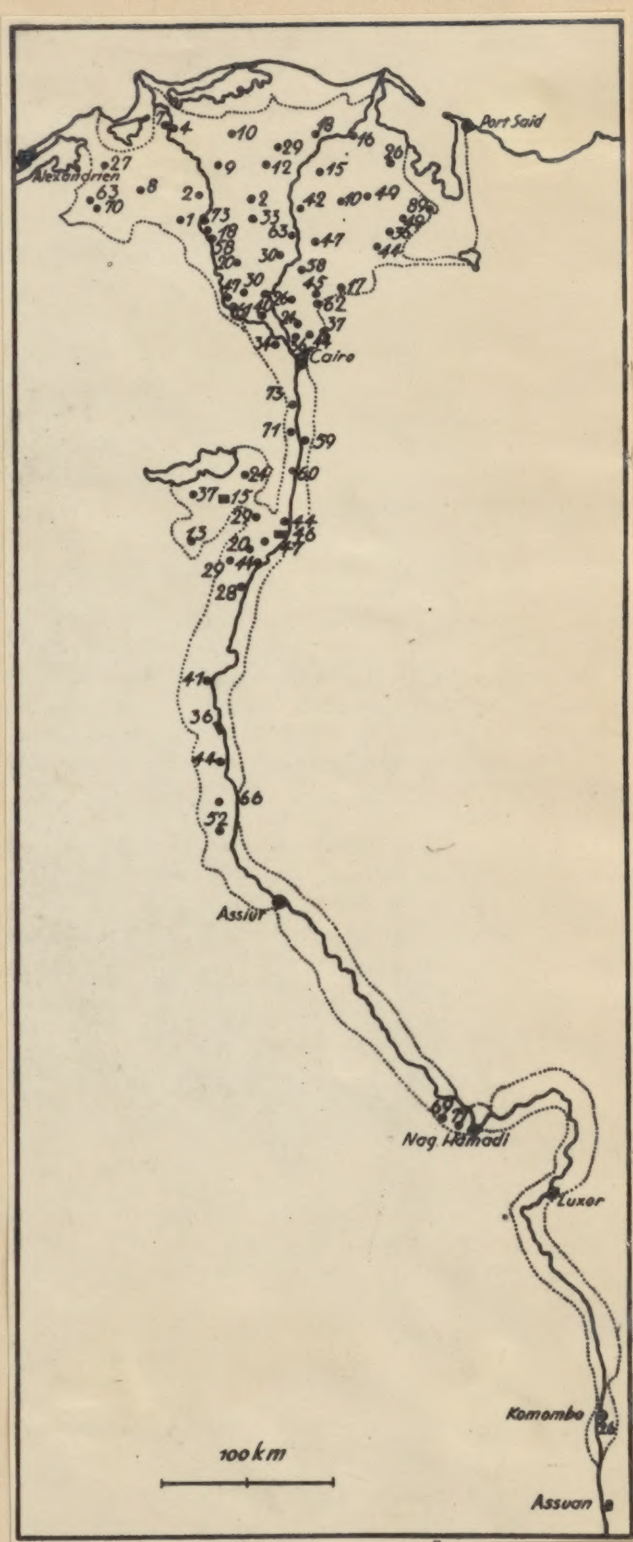

Illustration 1.
Ankylostomiasis in Egypt. The figures show the percentage of ankylostomiasis among the population (Acc.to SCOTT 1937).

with a thoroughly irrigated soil. The first cases were discovered by FERRIER (1906) in Mostaganem which is situated west of Oran on the coast. Furthermore, SERGENT and DE MOUZON (1910) observed hookworm eggs in the feces of indigenous Berbers in the Oasis of Mdoukal, in the mountain valley of Hodna. Later on more cases of infection were found in the same region, west and southwest of the Chott el Hodna. As local foci in this region Barika, Biskra, and Toga were mentioned (BENYAMINE 1934, THIODET 1939).

TABLE I.
Intestinal worms of 200 indigenous persons of Gafsa
(according to ESPIE).

1	time	ankylostoma duodenale,
4	times	ankylostoma and ascaris,
6	times	ankylostoma and trichuris,
35	times	ankylostoma, ascaris and trichuris,
1	time	ankylostoma, trichuris, and strongylus,
2	times	ankylostoma, ascaris, trichuris, and strongylus,
1	time	ankylostoma, ascaris, trichuris, and strongyloides stercoralis,
1	time	ankylostoma, ascaris, trichuris, and hymenolepis nana.

The information on the occurrence of hookworm infections in Morocco is scanty, but it is alleged that a certain number of cases is to be found among the population along the coast (CHANDLER 1929). Isolated cases found in Casablanca and Fez were not autochthonic, as they were imported from Cameroon and other central African territories (NORMET 1922, VIALATTE 1932, BENYAMINE 1934).

In Portugal the hookworm disease occurs as an endemic in the mines as well as among the farm workers (HEINE 1938). In the coal mines of San Pedro da Cova located in the north in the vicinity of Porto, RICCO (1926) examined 116 coal miners and he found that 55 of them (47 %) were contaminated with Ankylostoma duodenale. This author also found that 98 out of 100 laborers examined in the mines of Cabo Mondego near Figueira da Foz were carriers of the hookworm.

In Spain ankylostomiasis is found among the miners as well as among the farming population. BAILEY and LANDAZURI (1920) estimated the number of the infected miners at 10,000. However, 65 % of them harbored less than 25 worms. Clinical symptoms and an increase of the eosinophiles were almost always absent (MOLDONADO 1935). The anemia of the miners is very frequent in the mining districts of

Puertollano, Almaden, Sierra Morena, Horcajo (DE BUEN 1924). HERNANDEZ-PACHECO (1928) gives the following percentages of infections in the Spanish mines: Linares 30, La Carolina 14, Ciudad Real 43, Cordoba 58, Sevilla 35, Baleares 61, Murcia 1, Huelva 0, Santander 0, and Vizcaya 0 %.

The ankylostomiasis of the farm laborers was thoroughly investigated by DERRIBA and CANOVAS (1933, 1934) in the Huerta of Murcia. This is an area located in the valley of the Segura river which is 25 km. long and 14 km. wide with the town Murcia as its center. The first contamination with hookworm was found here in 1923. In 1934 the number of hookworm carriers in the district of La Raya amounted to 10.7 %. Men were more affected than women. The infections occur during farm work which is carried out with bare feet, particularly in the tomato culture and in the alfalfa fields. The damage caused by the ankylostomae is generally small. In the province of Valencia numerous cases of ankylostomiasis were also observed (RODRIGUEZ-FORNOS 1926) among the rural population working in the vegetable and rice fields. Similar data are available for the provinces of Castellon de la Plana and Alicante. It is, however, likely that foci also occur in other parts of the country, particularly in the South (Cadiz, Malaga?). Ankylostomiasis of brick-yard workers was observed by LOPEZ NEYRA (1922) in Lachar near Granada and by URBANO CASES (1928) in Navalmoral de la Mata (Caceres).

In Italy ankylostomiasis is less frequent among the coal miners than among the farming population. While the infections in the mines of Sicily and Sardinia are few in number they are frequent throughout the rural communities. Annually several hundred new cases are found: 1925 to 1932 an annual average of 300 cases, 1933 552 cases, 1934 1258 cases, in 1935 697 cases (LUTRARIA, ILVENTO, and MAZZITELLI 1936). Of the 94 Italian provinces, for the time being, only Lucania is entirely free from hookworm disease (VANNI 1938). Through an order of the Ministry of Health in 1933 the disease has become a reportable disease. Every case comes under treatment and all persons living together with the patients are examined together with them. Ankylostomiasis is particularly widespread in northern Italy, Liguria, around Modena, Milano and Firenze. The southern parts of the country, particularly Sicily, are also considerably infected.

The hookworms generally cause no persistent damages in Italy. They disturb, however, the normal condition of health by diminishing the natural defense forces of the organism, as is stressed by the

Italian authors. In Italy the exclusive parasite causing the hookworm disease is ankylostoma duodenale. Necator was found among a few remigrants from overseas. Now new infections with necator americanus occurred.

Very little information is available on the part played by the infection with hookworm in southeastern Europe. In Greece the disease occurs in an endemic form in the southern parts of the country, in Arcadia, Euboea, on the islands of the Aegean Sea, and in Crete (HEINE 1938).

In view of the conditions of climate it is probable that hookworm infections occur on the coasts of Turkey, and less probably in the interior of the country. There is no information on the extent of the disease. In Trabzon and particularly in the province of Rise (Lhasistan) a considerable frequency of hookworm infection was found by systematic investigations (CHANDLER 1929, ARAR 1935).

II. Bilharziasis (Schistosomiasis).

Bilharzia infection was observed in various countries of the Mediterranean basin. It is of the relatively greatest importance in Egypt, where the vesicular and the intestinal Bilharziasis is widespread among the population of the Nile delta region (see "Ankylostomiasis and Bilharziasis in the Near East"). Outside of Egypt no large foci of intestinal Bilharziasis (Bilharzia Mansoni) exist, while numerous centers of infection are known of the vesicular Bilharziasis (Bilharzia hematobia).

In Libya there is no vesicular Bilharziasis in the territories of the country where there is no water; there are particularly no cases of Bilharzia in the Libyan table-land, which is 620 M above sea-level (PATANE 1924). One of the centers of infection on the coast is Derna and its vicinity, where several cases have been observed. In this place, ZAVATTARI (1932) found ova with a terminal spine in the urine of 1.4 % out of 606 youths. There is also a small focus in Tauorga in the vicinity of Misurata on the coast. The disease is more widespread in the southwest of the country throughout the territory of the Oasis Gat on the Algerian frontier and in Fezzan west of that place. In the villages El Barcat and El Feuat in the Oasis of Gat NASTASI (1938) found infections in about two thirds of the population examined. In Fezzan according to ZAVATTANI 10 to 15 %

of the adults and 60 to 70 % of the children suffered from Bilharziasis. Similar figures were found by NASTASI, who observed 169 males, 19 females and 135 children suffering from Bilharziasis (see Illustration 2). Only 2 cases of intestinal Bilharsiasis have been observed in Libya so far. They roused the suspicion that there is a focus of intestinal Bilharzia in Gat, all the more as Planorbis Pfeifferi was found there as the possible vector.

Illustration 2.
Bilharziasis in Fezzan.

In the underlined villages Bilharzia patients and Bullinus snails were found simultaneously (according to NASTASI 1938).

Bullinus truncatus, the snail transmitting the vesicular Bilharziasis is widely distributed throughout Libya. It is found in Derna and its vicinity (Ouadi Derna, Ouadi El Atrum, Umerrezen, Ain Zara), in the Oasis of Ghadames and in numerous villages of the Fezzan area.

In Tunisia the occurrence of vesicular Bilharziasis has been known for a long time (BRAULT 1891, SONZINO 1893). The principal centers of infection are the Oasis of Gafsa and several places located around the salt swamps of the Chott Djerid (see Illustration 3). According to GOBERT (1934) the population of Gafsa is infected with Bilharzia hematobia to more than 50 %. In 1932 58 % of 964 persons examined (including all school children) had ova with a terminal spine in their urine. The girls were infected more frequently than the boys, and the men more frequently than the women. In various small villages in the environment of Gafsa (Sidi Mansour, El Ksar, Lela) the indigenous population suffers from vesicular Bilharziasis. Likewise in the Chott Djerid and particularly in the Oases of El Oudiane (Degache, Zaouiet, El Arab, Zorgane, Oulad Majed) numerous indigenous persons were infected; there is no Bilharziasis, however, in the Oases of Nefta and El Hamma, located in the neighborhood. In Tozeur, a big village south of El Oudiane, infection with Bilharziasis is rare. An important area of Bilharziasis is the region

of Nefzaoua with numerous villages contaminated, namely Kebili, Djemna, El Aouina (see Illustration 4). Finally some cases were found in other districts of Tunisia, for instance in Matmata in the southeast, in Kairouan in central Tunisia, in the region of Cape Bon (?) and of Tabarca in the north of the country.

Illustration 3.

Bilharziasis in Tunisia.

▲ Vesicular Bilharziasis, ¤ Intestinal Bilharziasis ______ Bullinus

xxx Planorbis

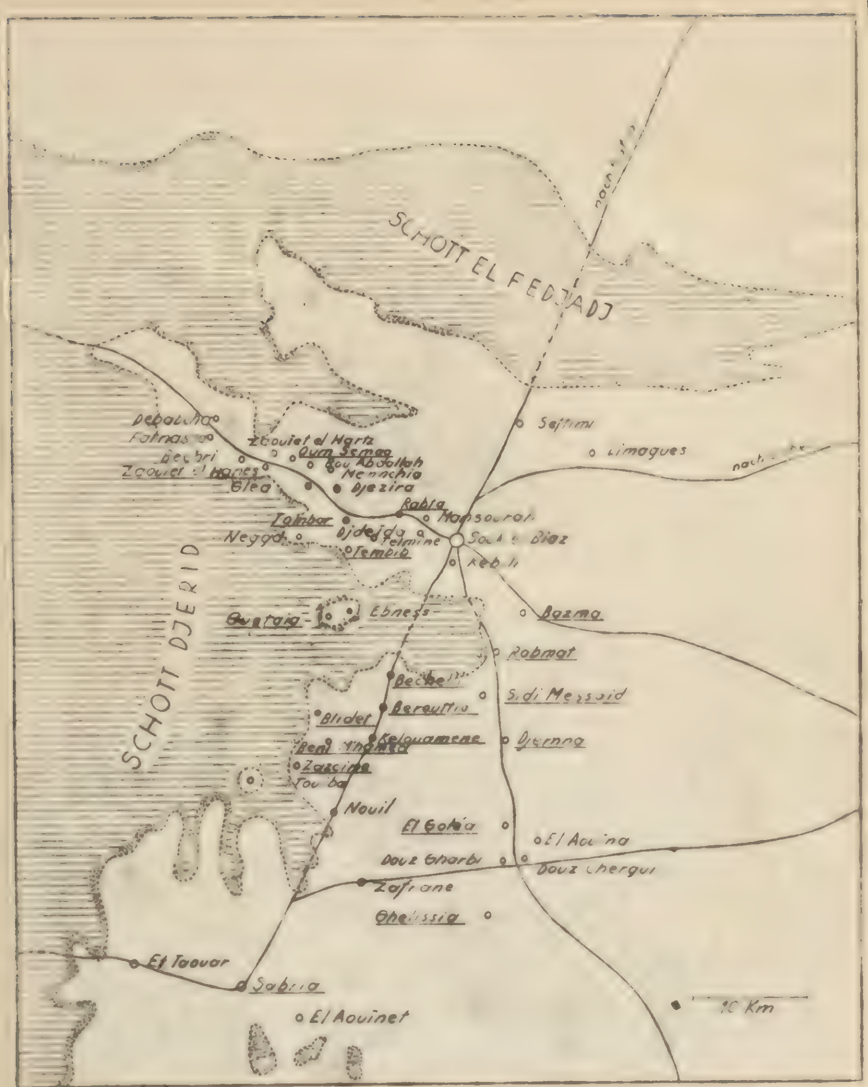

Illustration 4.

The distribution of Bilharziasis in the area of Nefzaoua (according to BOUSQUET 1930).

In the underlined villages Bilharziasis and Bullinus snails are found simultaneously.

Particularly the children between 5 and 15 years are contaminated and in their urine blood containing ova with a terminal spine can be found. Even though the disease occasionally heals spontaneously and with regard to its consequences cannot be compared with the Egyptian Bilharziasis, some of the adults, particularly males, suffer from its late consequences.

Intestinal Bilharziasis (Bilharzia mansoni) does not seem to be endemic in Tunisia, although 3 single cases were observed in Degache, Kebili, and Matmata (ANDERSON 1923).

Bullinus truncatus, the vector of Bilharzia hematobia, is widely spread. In the Oases of Gafsa and Nefzaoua snails are living in numerous water holes. In these places they are found in the spring-fed lakes with an abundant growth of plants and stagnating water and they can be traced on the bottom and particularly on the remnants of suspended parts of plants as on the underside of palm branches floating in the water. In the deeper springs with a smaller growth of plants and a considerable flow of water the Bullini are less frequent. They are entirely absent in the warm springs of Gafsa, as soon as the water temperature exceeds 28°C. In water holes, where other species of snails are frequent, Bullinus, as a rule, is found in small numbers only. Planorbis species do not occur in southern Tunisia, while Planorbis philippii subangulatus was found in some places of the north between 37° 21' North and 36° 23' N (see Illustration 3, ANDERSON 1923).

In Algeria Bilharziasis has so far been found only in two places: in the southeast on the Libyan frontier 84 (45 %) out of 184 indigenous persons were infected in the Oasis Djanet in 1925. According to BERGEROT (1935), who examined 204 indigenous persons in 3 villages of the Oasis Djanet 56 (27 %) persons excreted ova with a terminal spine through the urine. - The second Algerian focus of Bilharziasis is located in the north along the railroad track between Oran and Algiers. It is a small village, Saint-Aime, with 1729 inhabitants, located 9 Km. from Inkermann and 35 Km. from Relizane in the valley of Cheliff in which there is an extensive system of irrigation canals. ALCAY, MARILL, MUSSO and CASTRYK (1939) found hematobia ova in the urine of 42 persons out of 96 examined, while a total 52 suffered from hematuria.

Bullinus snails occur in Algeria in the spring-fed lakes of the Oasis Djanet and in some places of the coastal region only: in the irrigation canals of Saint-Aime, in the canal of La Macta, in the outlet of Lake Halloula, in the swamps of Mirabeau, in the vicinity of Bougie, and in Lake Oubeira not far from Bone (GAUTHIER 1934).

Intestinal Bilharziasis was found once only in a young indigenous person in Saint-Aime (MARILL, ALCAY, and MUSSO 1939). Planorbis snails, however, were not found in the vicinity of this place, so that one does not know which is the intermediate carrier.

In Morocco vesicular Bilharziasis is widespread in the south only, although Bullinus truncatus and Planorbis dufouri are also frequent in the north, for instance in the zone of Tangier (REMLINGER 1926). The cases found in northern Morocco among the Europeans and the indigenous population originate without exception from Fez (JOBARD 1924, RAYNAUD 1926). In the south since 1914, Marrakech has been well known as a focus of Bilharziasis. Carrosse (1930) had observed altogether 210 cases in this town and he reported that about 5 to 6 % of the Bullini collected in Marrakech contained furcocercariae. Moreover, thorough investigations in the focus of Bou Denib were made. Here, according to MEIDINGER (1931) 35 % of the indigenous population are infected on an average; in the garrison up to 80 % of some of the units were sick. Other centers of infection in southern Morocco are Ksar es Soud (according to reports of the French health authorities), Erfoud (VIALATTE 1932), the valleys of Oued Draa, and Oued Sous (BARNEOUD 1931), Oued Assa (BLANCARDI 1936), and Kari ben Aouda in Le Gharb (NAIN 1937).

In Europe Bilharziasis foci are exclusively found in the southwest of the Iberian Peninsula. According to BETTENCOURT and BORGES (1927) 3 centers of infection exist in the province of Algarve in southern Portugal: These are Tavira, Estoi, and the villages of Alportel. Alportel is located 28 Km. northeast of Tavira. The transmitter of the disease is Planorbis metidjensis var. dufouri. Contamination is promoted by the high mean annual temperature which in this area is 18.6°C., and by the occurrence of hot springs in which the infected snails live.

It is possible that in Spain a focus of vesicular Bilharziasis exists which is located in Lorca in the province of Murcia (SANCHEZ COVISA 1922).

According to GERMAIN and NEVEU-LEMAIRE (1926) Bullinus truncatus (the same as B. contortus) was found in France in the province Pyrenees-Orientales only. It also is frequent in Catalonia. In addition the snail is found in Corsica, Sardinia, Sicily, and on the Italian mainland in the Campagna (ZAVATTARI 1929, BRUMPT 1930). There is, however, no endogenous Bilharziasis in southern Europe except for the Iberian peninsula (CAROSSE 1930).

Finally several cases of vesicular Bilharziasis in Cyprus are mentioned in the literature. The only focus is the small village of Syrianokhori in the vicinity of Morphou in the north of the island; it is known since 1902 (G.A. WILLIAMSON 1902, 1907). According to McKINLEY (1935) 14 cases of Bilharziasis were observed in Syrianokhori during the year 1933; their focus was accurately delimited by LEIPER (1928). In Syrianokhori and its environments LEIPER found the following snails: Melanopsis, Linnaea, and less frequently Bullinus. Several cases of Bilharziasis were observed in Morphou itself, but they seemed to be caused by bathing and fishing in the pools of the dried out river bed of Syrianokhori during the summer months. In other parts of Cyprus no Bullinus snails were found by LEIPER.

All other areas of Bilharziasis in the Mediterranean basin (Palestine, Egypt) were discussed in detail in the section "Near East".

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DISTRIBUTION OF THE YELLOW FEVER MOSQUITO (AEDES AEGYPTI) AS VECTOR IN THE MEDITERRANEAN REGION

(with 1 text-map)

Translation prepared by:
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The yellow fever mosquito (Aedes aegypti, former name: Stegomyia fasciata) is distributed throughout the Mediterranean region except the northern section of the Adriatic and parts of the French coast. It may be imported also into these regions by ships or airplanes and persist there in summer. In the area of the Black Sea, it occurs constantly only in the eastern section on the Georgian coast and in the eastern part of the coast of Asia Minor, while toward the west, only Istanbul is again a reported location. In summer, it can be found also on the Crimea. Its distribution is generally indicated by the 6° C. January isotherm (see map). Where summer temperatures remain low, however, such as in Brittany or on the Bay of Biscay, its boundary lies more southward.

In "Encyclopedie entomologique", vol. 1: Les moustiques (Paris 1942), SEGUY shows a map of the probable constant distribution of the yellow fever mosquito in the Mediterranean region and western Asia (see Illustration 1).

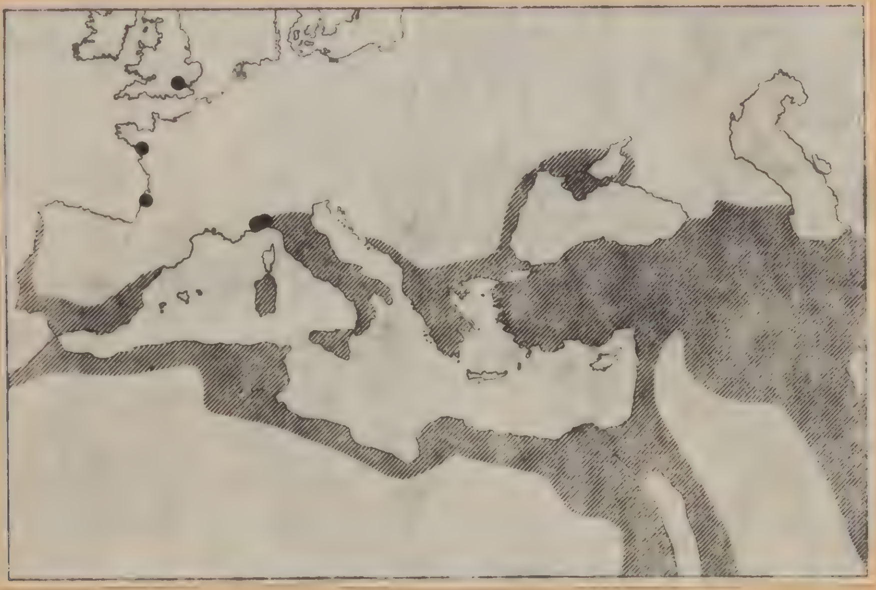

Illustration 1. Constant distribution of the yellow fever mosquito (according to SEGUY 1942)
• occasionally observed occurrence

This map is correct for the Mediterranean region but wrong for the Black Sea region where no constant occurrence is reported from the indicated area of the western coast. Also in the area of the southern Caspian Sea, nothing is known of any occurrence of the mosquito.

The geographical distribution of the yellow fever mosquito in the countries with hot climates within the ring of the 6° C. January isotherms is generally determined by the following behavior:

The optimal temperatures for the yellow fever mosquito lie between 28° and 32° C. Within these temperatures, it finds its best possibilities of development and living. In temperatures below 17° C., its eagerness to bite decreases, though bites have been observed at temperatures of 14° and 15° C. Below 6° C. the mosquito perishes.

The females live for 1-2 months and deposit around 750 eggs on an average. The eggs are deposited on water or above the water surface at the edge of the reservoirs. The larvae creep forth only at temperatures above 20° C. They may creep forth within a few days, but also only months afterwards under certain conditions. By such a "slow-hatching of the eggs", the yellow fever mosquito is capable of persisting through periods of unfavorable temperatures. Under the most favorable conditions, the development is achieved within 9-10 days. At temperatures below 17° C., the development is stopped. While the eggs are insensible to slight transitory effects of frost, the larvae perish. The mosquito may persist as adult insect in houses and stables through the winter in the Mediterranean region. Breeding places for the larvae are water reservoirs of every description, both in the open and in closed rooms, water casks, raintubs, cisterns, eaves, cans, flower-vases etc. The larvae do not live, however, in large pools or other stagnant waters. Under favorable conditions of temperature, the mosquitoes are extremely importunate, particularly when there is much moisture in the air and decreasing pressure of the air. They bite chiefly in the daytime, but also at night. Their flying range is inconsiderable (100 M.), only in exceptional cases it is around 1 Km. But the mosquito is frequently transported by all means of communication,

since it likes to sit in dark corners and may also subsist several days without any nutrition of blood.

In the Mediterranean region, the yellow fever mosquito plays an important role as a vector of the dengue fever. Pandemics repeatedly occurred there, in the course of which whole towns were suddenly affected with it. I remind you only of the great epidemics of 1889 and of the last in Athens in 1928. There is always the possibility of dengue epidemics in towns, if more than 15 % of the houses are populated with yellow fever mosquitoes. To control present epidemics or to remove the hazard of further spreading, the "Stegomyia index" must be reduced to 5 %. This is associated with the limited flying range of the mosquito. A particular hazard is also present if multitudes of yellow fever mosquitoes slip out immediately after the occurrence of the first few cases in period with rising temperatures of the air and simultaneous great moisture of the air. Even on the second day after biting a dengue patient, the mosquito becomes infectious and remains so up to the 27th day, if not its whole life. Not even the lowest temperatures which the yellow fever mosquito is barely capable to survive do any damage to the dengue virus.

According to a report of MOUTOUSSIS, the great pandemic in Athens in 1928 was preceded by several thousand cases during the months September - November 1927. These had been limited to a few districts of the city of Athens. The first few cases occurred in the environs of a family who had moved in from Alexandria. The disease is said to have spread at first slowly from the neighborhood of that house. In 1928, a few individual cases occurred as early as in spring after Easter. By the end of July and in all August the epidemic had spread in pandemic form over the whole city of Athens and the port of Piraeus, so that the number of cases is estimated to have been around 500,000 cases, i.e. around 80 % of the population of the infected districts. After the middle of August 1928, the epidemic also has spread in most of the parts of Greece.

The yellow fever mosquito is of particular importance as the vector of the yellow fever virus. Yellow fever, however, is not endemic in the Mediterranean region.

Only occasionally during the past centuries it has been imported by ships from West Africa and South America to the parts of the southern coast of the Iberian peninsula and to Marseille. Some importations have caused great epidemics, such as in Cadiz in 1800, 14,000 cases, and in Gibraltar in 1804, 15,000 cases with 5,700 fatal cases. The yellow fever cannot become endemic in these zones, since the yellow fever area is not exclusively determined by the ecological laws of the vector but rather by the living conditions of the yellow fever virus.

In the middle of its development, the yellow fever virus requires a period for maturation which depends to a great extent on the temperature. The lower the outdoor temperature, the less prospect of survival exists for the virus in the mosquitoes. After infection, the yellow fever virus can be transferred afresh at high temperatures (higher than 31° C.) in 4-5 days, at 31° C. in 6 days, at 25° C. in 8, at 23° C. in 11, at 21° C. in only 18 days. At temperatures of 18° C., however, the infected mosquito is not yet infectious even 30 days afterwards. These data show why yellow fever does not become endemic in the Mediterranean region despite the presence of the vector. The epidemic imported to the Mediterranean region will always die out soon there due to the climatic conditions, particularly since the virus is not passed on from one mosquito-generation to the following.

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DISTRIBUTION OF TICKS AS VECTORS OF DISEASES IN THE MEDITERRANEAN REGION

(with 2 text-maps)

Translation prepared by:
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In the Mediterranean region, the distribution areas of two epidemics meet, which are determined by the occurrence of ticks, because the transfer of these epidemics - the tick relapsing fever (see "Relapsing fever in the Mediterranean region" by Otto FISCHER) and the exanthematic tick fever or Marseille fever (see Map VII/10) - to man depends on the mediation of ticks.

As contrasted to similar epidemics transferred by lice, tick relapsing fever and Marseille fever play only an insignificant role in the Mediterranean region. This is associated with the possibilities of infection. The transferring ticks are animal-parasites and infect man only occasionally, if man is in close contact with the host-animals of the ticks, and ectoparasites pass over to him, or if the usual host-animals of the ticks do not exist and the ticks try to use man as a host.

The occurrence of the transferring ticks seems to coincide largely with the occurrence of the host-animals. Rhipicephalus occurs everywhere, where dogs live or stayed. The north African species of Ornithodorus are largely adapted to rodents and live particularly in the burrows of the large and small desert-mouse (Meriones shawi Roz. and Gerbillus gerbillus Ol.) and of the porcupine (Hystrix cristata L.). In addition, Mus rattus norvegicus is once mentioned as host-animal. Other rodents occurring in North Africa are not mentioned in the literature, though it is probable that Ornithodorus is to be found in their burrows as well. If the rodents leave the burrows, the hungry ticks seek a new host and then occasionally get to man, to whom they transfer the spirochaetes of relapsing fever by biting him or by the coxal fluid. In districts where pigs are kept, the ticks are frequently parasites on the pigs which, however, are no virus reservoir.

All species of Ornithodorus are animals active at night which hide in the daytime in fissures or between bricks like bugs, and seek their victims in the dark. The blood-sucking lasts about half an hour on an average.

The spirochaetes of relapsing fever as well as the rickettsiae of Marseille fever in the ticks are transferred from one generation to the other in the eggs. It has not yet been positively proven that dogs may serve as a reservoir for Marseille fever. On the other hand, rodents can certainly be regarded as a virus reservoir for the spirochaetes of relapsing fever. In addition, some other animals must be considered as reservoirs (see following section).

The following species of ticks can be vectors:

I. Ixodines

Rhipicephalus sanguineus Latreille must be regarded as the only vector. By its bite it transfers Marseille fever (Fievre boutonneuse), lives as a dog-tick on dogs, foxes and jackals, and is found in their living-places. Bites man occasionally. Geographical distribution: cosmopolitan, imported also to Germany, where it may be found in hotels.

France: Toulon, Rognac, St. Marcel, Marseille, St. Cyr, La Ciotat, Cannes, Nice, Sorgues, La Barque-Fuveau, Le Brusq, Ste. Maxime, Region de Gard; Tunisia: (no specific location); Algeria: Algiers, Chiffalo; Morocco: Tangier, Ain Mazi, Mers Sultan (Plateau near Casablanca), Rabat; Tripolitania: Tripoli; Greece: Piraeus, Vollo, Athens, Thessalonike, Mytilene, Thouria; Portugal: (no specific location); Crete: Rhetymnon; Italy: (no specific location); Serbia: Uskub; Bulgaria: (no specific location); Corsica: Bastia; southern Hungary: (no specific location); Roumania: Constanta; Asia Minor: (no specific location); Georgia: Poti; Egypt: Cairo; Palestine: Jerusalem.

II. Argasines

Several species of Ornithodorus are vectors of diseases. The important facts of their way of living have been mentioned before.

1. O. erraticus Lucas (= O. maroccanus Velu). Distributed in southwestern Spain, northwest Africa (southernmost location Dakar), extends through Morocco, Algeria, Tunisia allegedly to Egypt, probably also to the Peloponnesos. Cases of relapsing fever caused by an agent similar to Sp. hispanica, have been reported from there. Found in burrows of rodents and pigsties. Principal vector of the Spanish relapsing fever.

Illustration 1. Occurrence of ticks in Tunisia
Ornithodorus erraticus Lucas
Ornithodorus normandi Larroussei

Morocco: Mansouria, Rabat, Doukkala, Douar Korlea Chouia, Oulad Fredj, Casablanca, region of Kenitra, region of Tetuan, Constantine, 18 Km. north of Biskra, Ferme Dufourg, Bou Znika, Bou Denib, Salsafat, Kenitra, Tetuan, Mazagan, Environments of Goulimine, Douar Lamouitet (near Oualidia), Douar Regagda near Oualidia; Algeria: La Calle, Houbeira near La Calle, Nemours and environments, Algiers, Beni Ounif, Figig; Tunisia: Carthage, Tunis, Bizerte, Ferryville, Menzel-Temime, Bab-el-Allouche, Chaibine, Henchir-Zoutar; Oued-el-Khatef; Egypt: Asyut, el Hasaiba, Deirut; Spain: Acehuche, Malpartida de Plasencia (Caceres), Talavera de la Reina (Toledo), Olivenza (Badajoz), Malaga, Fuente Ovejuna (Cordoba), Alcolea, Navamorcuende, Huelva,

region between Aigueras de Vargas and Barcarota, Campillo de Salvafiera, Macotera, Aldehuela de la Boveda, Ciudad Rodrigo Boada, Cilleros el Hondo, Miranda de Azan, Monterrubio de las Sierra (all locations in the province of Salamanca), Navalmoral (Caceres), Sevilla, Cadiz, Jaen, Ciudad Real.

A map on the distribution of relapsing fever in Spain was given by DE BUEN in 1926 (Distribucion Geographica de la Fiebre Recurrente en Espana. - Ann. Acad. Med. Quirurg. espan., XIII, p. 271, Madrid 1925/26). At that time, the transfer by ticks was still unknown. The map fully coincides with the distribution of the ticks, which has become known in the meantime.

Illustration 2. Occurrence of relapsing fever in August 1922 in southwestern Spain (according to S. DE BUEN)
• = 1 case

2. O. normandi (Larrousse). Previously found only in rodent burrows in Tunisia, especially in the region of Cape Bon. Transfers the Spirochaeta normandi as described by ANDERSON and cooperators, perhaps Sp. hispanica as well.

Tunisia: Carthage, La Marsa, Kef, Oued-el-Khatef, Henchir-ben-Abdelazis, Henchir-Zoutar, Si-Ali-Dahli, Henchir-Chabane (Mengoub), Gabes.

3. O. foleyi Parrot (= O. franchini Rondelli). Similar to O. lahorensis. Tripolitania, Libya, interior Sahara (Hoggart, Libyan Sahara). Host-animals: domestic animals, dromedary, gazelle, sometimes also man. Hides in daytime in sand, holes, fissures of stones etc. Called "Tebbia" by the natives in Ghadames, "Rhambda" in the Marmarica. According to the natives, it is a vector of tickbite fever (RONDELLI).

Hoggar, Oulad Ighaghar, Ghadames, Tgutta (Tripolitania), Marmarica caves, Bardia, Cufra.

4. O. delanoei Roubaud & Colas-Beloour. Morocco. In the burrows of porcupines. Role as a vector unknown.

Morocco: region of Mazagan.

5. O. papillipes Birula. The most important facts about this vector of Asiatic relapsing fever have been mentioned on map II/3.

In the Mediterranean region only in Alep.

6. O. lahorensis Neumann. Is said to be a possible vector of tularemia in Asia Minor, in addition, is mentioned as a vector of Asiatic relapsing fever. Distribution see II/3.

Asia Minor: Ankara, no other locations; Jerusalem.

7. O. moubata Murray. Vector of African relapsing fever (Spirochaeta duttoni). Of no importance in northeast Africa.

Egypt: Cairo, no other location; Cirenaica (without location)

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RELAPSING FEVER
IN THE MEDITERRANEAN REGION

(with 1 text-map)

Translation prepared by:
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I.

The numbers of the various kinds of relapsing fever mentioned in the literature, whose agents have been throughout given particular names, are extraordinarily large and have been considerably increased recently. In addition to the variety of vectors, above all reactions of immunity but also in part a varying animal-pathogenity have been decisive for their differentiation. In the following list which is intended in the first place to give a general synopsis of all kinds of relapsing fever occurring on the globe, only the large groups have been mentioned which frequently overlap one another or even pervade each other, which is the case e.g. in the Mediterranean region (see section II).

A. Europe

1. East European relapsing fever (RUTTY):

Synonyms: Relapsing fever European Type (English), fievre recurrente mondiale (French), fievre recurrente a poux (French), Fiebre recurrente (Spanish), febbre ricorrente (Italian).

Agent: Spir. Obermeieri.

Vector: Lice, chiefly clothes-lice, but probably the head-louse as well.

Occurrence: Eastern Europe, chiefly Russia, extending to Poland, Balkan (intensely distributed during the Balkan wars and during World War I). In western Europe, particularly frequent in Ireland during the first centuries.

2. Spanish relapsing fever (SADI DE BUEN).

Synonyms: Spirochetose hispano-africaine (French), Espiroquetosa hispano-africana (Spanish).

Agent: Spir. hispanica.

Vectors: Ticks: Ornithodorus erraticus (Lucas) = O. maroccanus (Velu) = O. hispanicus, a pig-tick.

Occurrence: The infection is chiefly found among swineherds in Spain (numerous provinces (see map VII/9), Portugal, Greece, also in western North Africa (see B 1b).

B. Africa

1. North African relapsing fever (ARNOULD):

Two kinds have recently been differentiated (NICOLLE):

a) the proper North African relapsing fever:

Agent: Spir. berbera (SERGENT and FOLEY).

Vectors: Lice.

Occurrence: Morocco, Algeria, Tunisia (SERGENT, who brought experimental proof of the transfer by lice in 1910), Tripolis, Egypt (DREYER).

b) the Spanish relapsing fever (cf. A.2):

Agent: Spir. hispanica.

Vectors: Ticks, chiefly O. erraticus, and the species mentioned below.

Occurrence: During the last few years, this form of relapsing fever has been described in increasing numbers by various explorers from all regions of North Africa:

Morocco (REMLINGER): As virus-reservoir, porcupine, jackal, jumping hare, and wildcat are mentioned.

Algeria (SERGENT): Transfer also by Rhipicephalus sanguineus. Virus-reservoir: rats and dogs.

Tunisia (NICOLLE): Vectors also O. turicata and O. normandi.

Tripolis (FRANCHINI): Vector also O. lahorensis.

2. Central African relapsing fever (LIVINGSTONE):

Synonyms: Zeckenfieber (German), Tick fever (English), fievre recurrente a tiques (French).

a) East African form:

Agent: Spir. duttoni.

Vector: O. moubata (MURRAY).

Occurrence: Starting from two old foci in German East Africa (Tanganyika) and on the Zambezi River, it extended along the lines of commerce in all directions up to southern Abyssinia, the Sudan, Somaliland, South Africa, and finally West Africa as well (see under b). Even in Madagascar, relapsing fever has been observed.

b) West African form:

Vectors: Ticks: O. moubata (MURRAY), O. erraticus (Lucas).

Occurrence: Congo, Gold Coast, Senegal (endemic focus in Dakar): In Dakar, Spir. crocidurae (MATTHIS) must be mentioned as a special form, which is found in shrew-mice, and is transferred from them by ticks also to man. In West Africa mice, rats, weasels, squirrels, and young foxes are regarded as additional virus-reservoir.

In addition, there is a relapsing fever in West Africa which is transferred by lice.

C. Asia

1. Indian relapsing fever (CARTER):

Synonyms: Bombay relapsing fever.

Agent: Spir. carteri (MACKIE).

Vectors: Lice, perhaps bugs as well.

Occurrence: In all regions of India, chiefly in the northern provinces and their adjoining countries (Afghanistan, Nepal), and on Ceylon.

2. Chinese relapsing fever (HILL):

Vectors: Lice, perhaps bugs as well.

Occurrence: In all regions of China, also in the former German protectorate of Kiaochow (UTHEMANN and FUERTH), in Tibet, Manchukuo, Korea, Siberia (Tobolsk), Japan, Indochina, Siam, Philippines, Netherlands Indies. In some of these countries, only infections imported from elsewhere exist, particularly if only a few individual cases have been described, such as in Siam and the Philippines.

3. Western Asiatic relapsing fever:

Agent: Spir. persica among others.

Vectors: In most cases ticks, chiefly O. tholozani. In addition, there are reports of: O. papillipes, O. canestrini, O. lahorensis, O. asperus (BRUMPT in the ruins of Kish in Syria), and Argas persicus.

In addition, lice are often mentioned, chiefly by German authors during World War I, when their importance as vectors of the disease has been concluded chiefly from the intense typhus occurring at the same time (MUEHLENS, KUELZ).

Occurrence: Persia ("Disease of Miana"), Turkestan, (salvarsan-proof), particularly Bukhara and Tashkent, Mesopotamia (among prisoners of war 1916 (KUELZ)), Syria (during the construction of the Baghdad railroad (SCHNEIDER)), Palestine: Tick fever of Palestine (CALWELL, ADLER) beside lice-infections (MUEHLENS).

D. America

1. North American relapsing fever:

Agent: Spir. novyi (SCHELLACK).

Vector: There are varied data in the literature as regards the vectors. Lice are mentioned (1844, cases from Ireland in Philadelphia), then bugs and ticks:

O. hermsi (California), O. turicata (Texas, Mexico).

Occurrence: In many states of the U.S.A., in Mexico (in Yucatan), and Cuba. It is still a question whether some of the diseases have been only imported from Asia (by Chinese), or from Africa (by negro slaves).

2. Central and South American relapsing fever:

Agent: Spir. neotropicalis.

Vectors: In most cases ticks, also lice in some regions. The following species of ticks are mentioned: O. venezuelensis, O. turicata, O. talaje, O. canestrini, and Argas americanus.

Occurrence: Panama, Colombia, Venezuela, Peru, Uruguay, Argentina (transferred by lice in the three last countries). Virus reservoir for the American relapsing fevers transferred by ticks: squirrels, chipmunks, and opossums.

E. Australia and South Sea

New Caledonia: Individual cases described by MORIN and GENVRAY 1925.

Vector: Unknown.

II.

Of the above mentioned forms of relapsing fever, the following forms occur in the Mediterranean region:

1. Eastern European relapsing fever (agent: Spir. Obermeieri - vectors: lice):

Dalmatia, Bosnia (particularly 1902/04), Roumania, Serbia, Bulgaria, Macedonia, Albania, Greece (also in some islands), Turkey (particularly during the Balkan wars and World War I), in Italy and Sardinia.

In western Asia, sporadic occurrence in Turkey, Syria, Iraq, Palestine.

East European   Spanish   North African   West Asiatic
relapsing fever

Illustration 3. Relapsing fever in the Mediterranean region

2. Spanish relapsing fever (agent: Spir. hispanica - vector: ticks):

In numerous provinces of southern and central Spain (see Illustration 1, map VII/9), Portugal, Greece.

In North Africa: Morocco, Algeria, Tunisia, Tripoli.

3. North African relapsing fever (agent: Spir. berbera - vector: lice):

All North Africa from Morocco to Egypt, and to the south up to the Sudan and Abyssinia.

4. West Asiatic relapsing fever (agent: Spir. persica - vector: ticks):

Extends from Iran through Iraq to Syria and Palestine.

Table I. Relapsing Fever in the Mediterranean Region
1918 to 1930
(according to Rapport epidemiologique 145 (Hygiene-Section))

	1918	1919	1920	1921	1922	1923
Europe:						
Italy	.	.	.	.	.	.
Yugoslavia	.	.	23	69	21	13
Roumania	.	.	19,452	4,663	444	152
Greece	.	.	.	.	.	.
Africa:						
French Morocco	.	.	.	.	.	.
Algeria	.	.	2	18	5	4
Tunisia	.	.	.	.	.	2
Egypt	12,642	3,272	2,876	1,217	172	39
Near East:						
Palestine	.	.	.	51	25	8
Iraq	.	.	.	3	0	1

	1924	1925	1926	1927	1928	1929	1930
Europe:							
Italy	.	338	289	195	214	153	.
Yugoslavia	15	15	1	2	1	1	0
Roumania	56	34	6	5	0	0	0
Greece	91	1	0	4	3	7	0
Africa:							
French Morocco	0	0	0	51	1	10	8
Algeria	1	0	26	68	43	.	.
Tunisia	1	6	5	0	0	0	0
Egypt	5	3	0	2	0	0	0
Near East:							
Palestine	11	22	11	25	28	19	20
Iraq	0	0	0	0	1	1	2

Note: . = no data available

Table I informs about the varied intensity of relapsing fever in the various regions. This table is an excerpt of the reports of the Hygiene section of the League of Nations. No differences have been made, however, between the various forms of relapsing fever. After World War I, considerable epidemics broke out in some regions, such as in Egypt 1918 with 12,642 cases. Even if the figure of the reported cases has considerably decreased meanwhile, Egypt must be called a principal focus of relapsing fever in the Mediterranean region. From Morocco, Algeria, and Tunisia, only sporadic cases of relapsing fever have been reported. In the south of these regions on the boundary of the desert, however, there are circumscribed foci, from which smaller or larger epidemics may start at any time. Even south of the Sahara, large epidemics of relapsing fever have been observed (1921-30). In this context, it is interesting that these large epidemics of louse-relapsing fever in Africa have not been associated with typhus epidemics.

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DISTRIBUTION OF RICKETTSIAL DISEASES THROUGHOUT THE MEDITERRANEAN BASIN

Translation prepared by:
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This group includes the acute infectious diseases which are caused by rickettsiae and usually communicated through certain arthropodes. Exanthematic typhus has been known to us for the longest period of time but the infrequent variations of this disease were not observed before the present century. Some of them are distributed throughout the entire world, others occur within a very restricted area only. In other parts of the world some of the latter occur as a closely related form. In addition it seems that there are local variations with very slight differences from each other which are by no means of a decisive importance.

I. EXANTHEMATIC TYPHUS (FRACASTORO 1546).

Synonyms: Exanthematic Typhus, Spotted Fever, Famine Fever, Jail, Camp Fever, Epidemic Typhus, Louse Borne Typhus Fever, Tabardillo (the latter term being used for the genuine as well as for Murine Typhus).

Organism: Rickettsia Prowazeki, da ROCHA LIMA 1916. Its virus reservoir is - as far as it is known - man suffering from typhus.

Vector: Exanthematic typhus is almost exclusively communicated by the body louse (pediculus corporis, de GEER). This usually is effected through rubbing the excreta of the lice infected with rickettsiae into the bite or into small lesions of the skin, rarely by the dispersion and inhalation of the dried feces.

Distribution: The principal territory of typhus incidence is eastern Europe and North Africa. However, it may occur in all other countries of Europe, Asia, and Africa. During the 19th and the 20th century typhus usually was intimately associated with war and in addition to dysentery it is the most important war epidemic even in our days. It occurs in widely separated parts of Central and South America, as well as in North America and Australia.

Its distribution throughout the Mediterranean countries and the adjacent territories varies.

Greater Germany, Italy, and France are almost free from exanthematic typhus during normal times. However, numerous cases were imported during World War I to the Central European countries where they gave rise to the formation of epidemic groups. Formerly there was an endemic typhus focus in Brittany, France; with the French Army, however, no case of exanthematic typhus occurred. From 1939 on exanthematic typhus

became inherent in Germany, as new territories were attached to Germany in the east. It remained confined there except for some isolated cases imported to the interior; but even in these eastern territories the number of cases is steadily decreasing. In Czechoslovakia typhus was important only throughout the Carpatho-Ukrainian territory, while it was negligible in Bohemia, Moravia, and in Slovakia. In Italy typhus was rare after World War I, and after 1930 it had completely disappeared there. No cases of exanthematic typhus were observed in Switzerland.

From the major part of Hungary only a sporadic typhus incidence is reported. However, there are several districts, principally in the south and the northeast of Hungary, where foci of typhus have been formed, such as in Borsod Abouj in 1931 to 1932, in the district of Csongrad in 1935-1936, and in other places in 1941, where the greatest morbidity rate occurred in the month of May. These foci apparently are connected with the great eastern European focus.

In Roumania the typhus fever incidence was high during the war of 1914-1918. The retreat of the Roumanian Army was accompanied by a widespread epidemic during 1916 which was still present in 1919 (56,242 cases) and 1920 (46,206 cases). Then it decreased rapidly to a certain moderate and constant frequency. The constancy was interrupted by a slight rise of the number of cases in 1936. Recently it is principally Bessarabia and adjacent areas of Roumania where typhus fever occurs in large numbers (Botosani, Iasi, Vaslui, and certain other areas). In the remaining parts of Roumania typhus fever usually occurs as isolated cases and foci are formed very rarely. The majority of the typhus cases is observed during the second quarter of the year. During the period from 1932 to 1935 the mortality varied between 9.5 and 10 %.

In Bulgaria small foci sometimes occurred in some of the districts principally throughout the province of Schumen, bordering on Roumania, but there was no particular accumulation of cases within any geographical area. Typhus generally occurs there as an isolated disease. The mortality from typhus is about 10 %.

There was a big typhus epidemic within the boundaries of Yugoslavia during the occupation in the course of World War I and during the retreat of the Serbian Army. However, the morbidity rate dropped soon and from 1922 on to 1932 it maintained a certain moderate level. Recently the provinces of Vrbas, Drina, and Littoral are particularly affected. Typhus occurs there in the valleys of the mountains and in the small towns. 1934 a typhus epidemic broke out in almost all districts (except for Sava and Beograd). However, the number of cases was

diminished to one third during the following year. In 1935 the largest number of cases was observed during the first and the second quarter. The mortality from typhus for 1932 to 1935 is given as 7 to 8 %.

In Albania the typhus morbidity seems to be small. It was only in 1932 that 9 cases of typhus fever occurred, while no cases were reported for most of all the other years.

In Greece typhus fever was endemic before World War I in Athens. About 40 to 70 persons died annually from exanthematic typhus. During the Balkan wars the morbidity rate was principally increased in Macedonia. In the Greek Army typhus was rare. A great epidemic, which was particularly widespread in 1923, broke out during the war between Turkey and Greece. But the typhus morbidity decreased rapidly in 1924. Typhus as a group disease was seen in the towns, such as Drama, Thessalonika, Athens (1933 - 1935). In other places typhus occurs only as a sporadic disease.

Typhus is widespread throughout the Iberian peninsula. In Spain it was frequent before the Ist World War. After the last war only some few cases were recorded in the annual reports, except for 1919 - 1920. Between 1900 and 1936 the aspect was subject to changes by repeated outbreaks in Madrid. Only during the period from 1917 to 1921 was typhus fever more frequent. Epidemic outbreaks of typhus repeatedly occur in the southeastern parts of Spain (Sevilla, Cadiz, Malaga, Granada, Almeria, Murcia). During the civil war from 1936 to 1939 the areas occupied by the Franco troops were free from exanthematic typhus (QUINTANA). The zone occupied by the government troops, contrary to that, suffered considerably from exanthematic typhus as it was frequently imported by newcomers from Russia, Poland, French North Africa, and the Balkan countries. No figures are available. In 1939 a typhus epidemic broke out in Madrid, which principally was imported from the southeastern provinces. In these, typhus was observed in 1940 and particularly during the year 1941. For 1941 the following data were recorded: Madrid 2011 cases, Seville 583 cases, Malaga 868 cases, Granada 557 cases, Cadiz 531 cases. The highest typhus incidence was observed during the month of June. As regards typhus the southeastern provinces of Spain have to be considered as the most hazardous parts of the Iberian peninsula.

In Portugal exanthematic typhus also is frequent. After World War I, during the years 1918 to 1919 an increase of typhus was observed in the Portuguese Army returning from the battlefields of France. In 1929 too, a small increase of the typhus morbidity was observed. After this time exanthematic typhus generally was not frequent. Sporadic cases and small

foci, however, were sometimes observed. 1934 to 1935, 164 cases were reported, 32 of which had a fatal outcome; 20 of the fatal cases occurred in the province of Viseu. In 1941 a total of only 24 cases with 4 deaths occurred. From 1 January to 30 November 1942 no case of typhus was observed throughout all Portugal.

In Turkey small foci are also frequent. During the war between the Turks and the Greeks a considerable increase of the number of typhus cases occurred. This number, however, dropped soon. For the time being typhus in the European provinces of Turkey is usually confined to Istanbul, while typhus was frequently observed in various districts of the Asiatic provinces, among them in the south in Konya and Seyhan during the period from 1933 to 1935, and in the west in Balikesir and Izmir (Smyrna). There was a slight increase of the number of new typhus cases in 1940 and 1941, the number of which was highest during the months of March to June. Generally the typhus morbidity is highest during the months of January to April. From 1933 to 1935 the mortality varied between 7 and 13 %.

Throughout the eastern Mediterranean basin typhus usually is found in coastal areas and in the densely populated towns. From 1934 to 1935 about 200 cases of exanthematic typhus occurred, 115 of them in Transjordan, and 81 in Palestine. 1936 and 1937 it was frequent throughout Palestine. From Syria typhus had almost entirely disappeared after the epidemic of Deir ez Zor in 1933.

Typhus has occurred throughout Egypt since World War I. In 1929 1141 cases were observed, 214 of which had a fatal outcome. Then, there was a considerable decrease of the morbidity rate. It increased considerably again from 1932 on and it attained its climax in 1933 and 1934. From this time on the morbidity rate constantly maintains a moderate height. In 1940 and 1941 the morbidity rate was increased again. The figures of the entire year of 1941 are not available, but during the week from 26 February to 1 March 1941 387 cases of exanthematic typhus were observed, 170 of them in Beheiza alone. The highest incidence was found throughout the Nile delta in lower Egypt with its towns and villages. Its course frequently used to be mild, although it is caused by the rickettsia Prowazeki (OTTO). In upper Egypt, contrary to that, usually only few persons and few groups of persons are involved with typhus fever. In 1938 the months of April to June showed the highest morbidity from exanthematic typhus. The mortality rate ranged between 10 and 15 % (1932 it amounted to 12.4 %, 1933 to 14.9 %).

In Libya typhus ranges with the rare diseases and only occurs sporadically.

In Tunisia typhus occurs in almost all parts of the country. It is observed sporadically and in accordance with the density of population, principally in the north of the country, as small or large foci. Most of the typhus cases were observed in the period between the end of February and the end of May. It has been well known for a long time (CONSEIL 1939) that yphus is spread along the routes of the indigenous traffic and then becomes inherent in the big settlements and towns where it frequently reappears. Typhus recurred frequently in the following settlements: 1933 Kef, 192 cases, 1934 Kairouan 79 cases, Tunis 117, Souk-el-Arba 262, 1935 Beja 192, in Kef 158, in Medjez-el-Bab 95, in Sousse 86, and in Souk-el-Arba 79 cases. During the years 1939, 1940 and 1941 the morbidity rate of typhus was considerably increased: There were 1072 cases in Sousse in 1941, 605 cases in Grombalia, 504 cases in Sfax, 430 cases in Kef, 424 in Kairouan.

In Algeria exanthematic typhus also is particularly frequent in the northern parts of the country; none of the districts, however, is entirely free from it. A particularly large number of cases was observed in 1937 and principally in 1941. In various years typhus occurred to an increased degree in the eastern parts of Algeria. Now and then a small number of cases occurs in every district. In 1933, 398 cases were observed in the district of Batna in the vicinity of Tunisia, 229 in Constantine, 83 cases in Setif. In 1941 typhus was frequent, particularly in the north: in Algiers 4220, in Oran 4370, and in Constantine 3619 cases occurred. In 1938 the majority of cases was observed during the period from March to June, in 1941 during the period from May to June.

In Morocco exanthematic typhus is also frequent. Foci are observed in the north and northwest particularly. It is principally spread along the traffic routes. A high typhus incidence was observed in 1938, the morbidity rate being twelve times that of the average of the previous years. The new increase during the year 1941 is proportional to that of Tunisia and Algeria, and the majority of cases was observed during the period from February to May.

Typhus Areas: There are at least three typhus foci throughout the Mediterranean basin:

1. The eastern European focus having its center in the European parts of Russia and in Poland. In the south it extends as far as to the Black Sea involving Bessarabia and the Carpatho-Ukraine in the west.

2. The Egyptian focus in Lower Egypt which is confined to the Nile delta.

3. The North African focus in Tunisia, Algeria, and Morocco, where the traffic routes and junctions are involved in preference.

4. In addition there may be a typhus focus in the Balkans, throughout the territory of Yugoslavia.

Sporadic cases of exanthematic typhus occur throughout the entire Balkan region, in Turkey, in the countries of the eastern Mediterranean basin and finally in Spain and Portugal. Here one must count with the occasional formation of foci.

Typhus is of little importance in Libya, Upper Egypt, Albania and throughout the major part of Hungary.

No typhus occurs in Germany including the Protectorates of Bohemia and Moravia, in France, Italy, and in Switzerland.

The area where typhus occurs, therefore, has its northern boundaries at a line separating France and Spain along the Pyrenees, continuing through the Adriatic Sea between Sicily and Tunisia, around Italy, turning to the north at the frontier between Germany and Croatia, or Hungary and Germany, and delimiting in the east of Germany the eastern European foci from the west.

II. ENDEMIC TYPHUS OF THE RATS (BRILL 1902).

Synonyms are: Murine Typhus, Hone's Disease, Ship Typhus, Typhus Murin, Urban Tropical Typhus, Shop Typhus, X19 Tropical Typhus, Brill's Disease which according to BRUMPT is not distinguishable from the Murine Typhus.

The causative organism is the rickettsia Mooseri (Monterio 1931) which is widely spread among all species of rodents.

Vectors: Among the rodents Murine Typhus is communicated through the fleas and the lice. It is communicated to man through the fleas, probably also through the bugs and the ticks and it even may be distributed through the body lice.

Heretofore the following vectors were found (BRUMPT):

Fleas: Xenopsylla cheopis Rothsch, tropical rat flea,
Nosopsyllus fasciatus Bosc., European rat flea,
Ctenopsyllus segnis Schoenh. , mouse flea,
Ctenocephalides canis Curt., dog flea
Ct. felis Bouche, cat flea,

furthermore: Xenopsylla astia Rothsch) Neither of them were
Liponyssus bacoti Hirst) found by MOOSER and CASTANEDA in 1932

Rat louse: Polyplax spinulosa Burm,

Bed bug: Cimex lectularius L.

Ticks: Dermacentor nitens Neuman
D. Andersoni Spiles
Amblyoma sp.

Distribution: Murine Typhus is frequently observed in various parts of the world, particularly in the ports and in the big cities. Apparently it is a widespread epizootic of the rats, which occasionally may be communicated to man. With rats the organisms were found even in places where no case of murine typhus was observed with man.

In France in the year 1916 9 cases, in 1917 10 cases were observed in Paris (NETTER). BRUMPT found that the organism is distributed endemically among the rats throughout Paris and he assumes that all rats are once in their lifetime infected with these rickettsiae. The proportion between the infected and the non-infected rats was 1:4. In Toulon mild typhus cases were repeatedly observed on board warships (MARCANDIER and PIETROT 1932 and QUERANGAL DES ESSARTS 1934). Some of these cases may have been imported. Most of them, however, were acquired on board the ships and the rickettsiae were also found in the rats of the ships and of the naval ports. In Toulon one rat out of three or four was infected (MARCANDIER and PIETROT). In addition, one found the organisms of murine typhus in places in which no cases of man sick with murine typhus were observed, which happened in Bordeaux, Lyon, and even in Belgium, f.i. in Antwerp (Le CHUITON and MOUREAUX 1932, ROCHAIX, SEDALLEIN,and BOUTNER 1932, MEIRHAREGHE 1933).

The mild cases reported from Italy seem to be cases of tick typhus and not of murine typhus (GUERRICCHIO).

Greece. In Athens and in the Piraeus the organisms were found in the animals and in man (LEPINE 1933).

Croatia. In Agram tick typhus was observed in 1935.

In Roumania the examination of the rats had a negative result (COMBIESCO and POPESCO 1933). Human cases of murine typhus were not observed.

Throughout the eastern Mediterranean basin the virus was found in the rats, f. i. in Beyrouth (P. LEPINE 1932).

Egypt. Murine typhus was observed in the rats of Alexandria. With these and with their fleas the organisms were found by PANAYOTATOU 1932. In several cases it was carried away from here to other places by ships.

Tunisia. The rickettsiae of murine typhus were found in the rats (NICOLLE and SPARROW 1934).

Morocco. Murine typhus was found by G. BLANC, M. BALTHASARD, and FISCHER in 1933.

Outside the boundaries of the Mediterranean basin the organisms of murine typhus most likely were found in Great Britain (RANDIE and MARIAN 1928) and with certainty among the rats in Moscow (KRITSCHEWSKI and RUBINSTEIN 1933, SOLOVTOV 1934).

The area where murine typhus occurs, therefore, is marked off in the north by a line going from the north to the south, east of Anvers and Paris, turning to the east on the southern side of the Alps, from here pointing to the southeastward direction and passing through Croatia between Agram and Belgrade, turning to the north in the south of Bucharest and ending in Moscow. Westward, southward, and eastward of this borderline one must take into account the occurrence of murine typhus in the rats and occasionally even in man.

III. EXANTHEMATIC TICK TYPHUS (CONOR AND BRUCH 1910).

Synonyms: Fièvre boutonneuse de Tunis (CONOR and BRUCH 1910), fièvre exanthématique de Marseille, fièvre exanthématique d'été de Maroc, fièvre exanthématique du littoral méditerranéen, fièvre exanthématique escarronodulaire (R. JORGE), Maladie de Conor, maladie D'Olmer, febbre erritiva del Carducci.

Organism: Rickettsia Conori Brumpt 1932 (Syn. R. Blanci Caminopetros). It seems to be widespread among the dogs of the hot countries.

Vector: Its only vector is the dog-tick Rhipicephalus sanguineus Latr. (BRUMPT).

Seasonal distribution: In southern France 62 cases occurred between the months of May and September, with a particularly high number of cases in August, in Tunisia 33 cases occurred in the period between April and October with a particular frequency during the months of August and September (CONSEIL), in Portugal 30 cases occurred in the period between June and October with a particularly frequent incidence during the month of September (R. JORGE).

Distribution: This type of typhus is distributed throughout the countries around the Mediterranean, and in addition throughout the Sudan, the Belgian Congo, the Kenya-and Tanganyika territory, southern Rhodesia, Union of South Africa.

Portugal: Cases occurred in Lisbon, Geuveia and vicinity (30 cases in 1927), Alcobaca, Porto (R. JORGE).

Spain: 1929, 8 cases were observed in Madrid, later on 6 more cases. 1 case occurred in Albacete 200 km. southeast of Madrid (R. JORGE). 1 case was seen in the Balearic Islands (DURICH).

France: In 1925 OLMER observed the first cases in Europe in Marseille, From this time on the disease was seen somewhat more frequently throughout the Mediterranean coast. In 1927 the number of cases was 38, in 1928 at least 60 (OLMER). Before 1928 159 cases were observed in the vicinity of the mouth of the Rhone river, 31 cases in the district of Vaucluse, 87 cases in the Maritime Alps, particularly in the vicinity of Cannes and Nice, 57 cases on the Var valley not far from Nice (CONSEIL), From this time on the disease probably was increased in frequency.

Italy: From 1910 to 1920 CARDUCCI collected 13 cases. More cases were found principally in the vicinity of Rome and in Luccania, but also along the entire western and eastern coast of Italy: In Naples, Palermo, Catania, Imola (east of Bologna), Genoa, Treviso (north of Venice), Fano (northwest of Ancona), Firenze (A. GUERRICCHIO), Messina.

Greece. Cases of exanthematic tick typhus were observed in Athens and Volos. In addition contaminated dog ticks were found (BLAND and CAMINOPETROS).

Roumania: CONSEIL observed 2 cases in 1911. In 1931, 34 cases were found in Constanza. (COMBESCO and ZOTTA).

Morocco: The first 2 cases were seen in 1928 (DELONANORE). Later on 12 more cases occurred (BEROS and BALOZET). From this time on the tick typhus may have occurred more frequently.

Algeria: Several cases occurred in Algeria.

Tunisia: The tick typhus was observed here in 1902 for the first time and a description was given in 1910 by CONOR and BRUCH. Before 1928, 36 cases had occurred (CONSEIL).

Libya: In Tripoli several cases were found (GABBI), in the Cyrenaica altogether 22 cases were observed during the period from 1914 to 1930.

Egypt: A disease closely resembling tick typhus was found in Khartoum (1913, BALFOUR).

Syria: Several cases occurred in Beyrouth.

Area: The endemic tick typhus is exclusively found on and in the vicinity of the Mediterranean coast and it embraces the western parts of the Iberian peninsula. Sometimes cases of tick typhus occur in the interior in the neighborhood of the littoral.

The borderline of this area crosses Egypt and North Africa, it embraces the Iberian peninsula and then runs along the ridge of the Pyrenees. From here it crosses the Languedoc and finally goes along the southern side of the Alps and ends on the northern coast of the Black Sea. The route of this line through Caucasia and Asia Minor is unknown. Within this area tick typhus is liable to occur.

IV. VOLHYNIAN FEVER (WERNER 1916, HIS 1916).

Synonyms: Trench Fever, Febris Quintana, Five Day Fever, Fièvre des tranchées, fièvre tibialgique.

Organism: The causative organism for trench fever is the rickettsia quintana Schmincke 1917. Its synonym is rickettsia volhynia. It was seen for the first time by TOEPFER in 1916. The virus reservoir is not recognized as yet.

Absolute figures of the reports of Typhus

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	Number of inhabitants	Year
Europe														
Germany	0	1	3	4	1	1	0	0	0	1	558	..	66,030;000	1933
former Austria	1	0	..	..	..	..	..	..					6;758;000	1930
Italy	0	1	..	..	..	..	..	..	..	..	..	..	43;142;000	1938
France	2	0	..	..	..	1	4	1	1	..	3	6	41;980;000	1938
form. Czekoslovakia			30	127	328	171	439	92					14;730;000	1930
Hungary	(+1) 3)	0	6	78	45	29	20	22	..	..	92	682	9,060;000	1938
Roumania	1857	1419	1801	1790	2296	2807	7093	4976	2255	734 2)	1199	1880	19;750;000	1938
Bulgaria	292	219	359	178	285	77	207	160	91	86 2)	117	287	6;253;000	1938
form. Yugoslavia	154	128	173	825	2210	680	775	942	686	..	310		15;384;000	1938
Greece	63	114	92	60	75	40	75	73	60	..	49		7;061;000	1938
Spain	(+7) 1)	5	9	10	27	3	5	10	8	..	1086 1)	6857	25,493,000	1938
Portugal	57	19	34	6	121	43	9	67	37	26	..	11	6,951,000	1938
Asia Minor														
Turkey	259	182	93	194	272	422	401	667	450	387 2)	816	950	16,158;000	1935
Palestine	30	51	30	29	26	55	280	262	176	270	203		1,435,000	1938
Transjordan	0	30	19	68	60	55	35	15	..	..	8		332,000	1935
Syria	0	7	2	467	2	1	2	1	16	7	2		3,600,000	1937
Africa														
Egypt	288	265	2298	7865	7536	3151	2757	2083	2811	4108	4184 2)		16,237;000	1938
Libya	0	0	1	2	0	6	1	88	..	..	isolated cases		840;000	1936
Tunisia	170	335	306	343	781	950	841	3778	2376	6016	643 4)	7226	2;608;000	1936
Algeria	190	192	395	876	371	596	1168	3299	1564	2294	12892		7;235;000	1936
Morocco	170	403	256	451	303	431	173	1844	7437	..	355	1594	6,296,000	1936

1) Deaths. - 2) No data for the last 4 weeks of the year. - 3) No data for January to March.-
4) Incomplete figures for 8 weeks. - No data: -

Vector: Volhynian fever is communicated only by the body louse (pediculus corporis de Geer).

Distribution: Trench fever is endemic throughout Poland, Volhynia, and the neighboring territories. During World War I it principally occurred among the German troops, and it is likely that it was carried from here to the other theaters of the war. On the western theater it occurred on both sides (France, Meuse valley, Flanders), in Macedonia and in Mesopotamia. Several cases were also seen in Egypt. 1938 the Volhynian fever occurred in Spain during the civil war where it most probably was imported by the foreign troops recruited by the government.

It is most remarkable that trench fever apparently did not persist outside the boundaries of its proper territory of origin, the white Ruthenian area, and that it disappeared again when the imported cases had subsided.

Area: No details are known as to the area where Volhynian fever occurs. Of the countries belonging to the Mediterranean it is widespread only in the Ukraine, Bessarabia, and throughout the Caucasus. These territories are included in the original focus. It was not possible to find out whether or not trench fever also occurs in other countries.

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EXANTHEMATIC TYPHUS IN SPAIN.

1939 to 1942.

Translation prepared by:
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Since the end of the civil war in Spain exanthematic typhus has been widely spread again throughout Spain. This disease which has been widely distributed there since ancient times showed a continuous regression from the end of the last century on (cf. table I) and it occurred only sporadically in the Spanish capital, Madrid, and in the five southeastern littoral provinces (Sevilla, Malaga, Granada, Almeria, and Murcia - cf. map No. VII/10a).

During the 2½ years of the civil war in Spain no cases of exanthematic typhus occurred throughout the territory held by the Franco-troops, although there was a severe typhus epidemic in North Africa at that time (9,000 typhus cases in French North Africa in 1937). In the littoral provinces of Almeria and Murcia typhus was endemic during the civil war and it was spread among the population and the government troops which were contaminated with typhus through supplies from eastern Europe, Algeria, etc.

From here the typhus epidemic was spread around by the shift of the population within the boundaries of Spain beginning after the end of the civil war.

The first extensive epidemic occurred in Madrid, the capital, immediately after the city was occupied by Franco's troops. The first cases of typhus were observed here on April 8th, 1939. 23 out of the first 27 cases were imported from the southeastern provinces (cf. the lines on the maps). 57 cases were found in Madrid. During the period from 1 May to 9 December 1939 72 cases more of typhus with 12 deaths were reported to the International Health Office in Paris. During the same year some small foci were found in Salamanca (epidemic among the prisoners), where 15 cases occurred, and in Villarobledo (province of Albacete), and in Valladolid.

In May 1940 further small local outbreaks of exanthematic typhus occurred in Guadix (province of Granada) with 40 cases and in Granada and Seville (50 cases). Towards the end of 1940 typhus broke out again in its old endemic area of Murcia and Almeria (no figures available), and in the beginning of January also in Madrid. By the end of March 1941 the daily morbidity rate for typhus was increased to 30 cases im Madrid which were observed throughout the entire area of the city. However, proper foci were not recognizable. The explanation for this is given by the Municipal Health Office of the city of Madrid which observed an increase of the louse infestation of the population attaining an average percentage of 35 % in 1941. From Madrid (city and rural communities) altogether 2011 cases were reported. According to the figures given by the General

Director of the Public Health Services of the International Health Office in Paris the mortality was 11.08 %. After Madrid, the number of cases was highest in Malaga with 868, Seville with 853, Granada with 557, and in Cadiz with 531 cases. Altogether 6857 typhus cases were observed throughout Spain in the year 1941, the mortality being 13 % (after QUINTANA).

Table 1.

Mortality from Typhus in Spain (according to P.de la QUINTANA).
1901 - 1938.

Year	Mortality (abs.figures)	Year	Mortality (abs. figures)
1901	128	1920	153
1902	55	1921	73
1903	184	1922	80
1904	400	1923	35
1905	138	1924	18
1906	120	1925	10
1907	91	1926	8
1908	58	1927	17
1909	671	1928	10
1910	301	1929	14
1911	134	1930	7
1912	102	1931	5
1913	243	1932	7
1914	82	1933	10
1915	51	1934	2
1916	52	1935	3
1917	68	1936	5
1918	13	1937	10
1919	227	1938	9

This epidemic did not abate and it persisted during the first months of the following year (1942). During the period from 1 January to 30 April 1942, 1193 cases of typhus occurred in Madrid. During the same period a new outbreak of typhus was observed in Barcelona with 761 cases. The other foci are in regress except for the province of

Cadiz (711 cases before April 30th, 1942). However, in the course of 1942 typhus has become considerably more widespread than during the previous years so that for the time being the entire southeast of Spain must be considered as exposed to exanthematic typhus. Moreover, sporadic cases of typhus also occurred in other Spanish provinces after the beginning of 1943. New cases were observed in the northern provinces of Barcelona, Navarra, Valencia, and Leon.

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TYPHOID FEVER IN SPAIN AND PORTUGAL.

Translation prepared by:
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No geographical and medical investigations of the endemic occurrence of the abdominal typhus and of the paratyphoid diseases in Spain and Portugal were made as yet. In spite of the wide distribution of both diseases throughout the Iberian peninsula insufficient material is available for the geomedical investigation of the epidemiology of the typhoid diseases. The following discussions, therefore, can only be an attempt to give a survey of the epidemiological situation in the course of one year of the last war (1941) as far as the material was available.

The mortality rate of typhoid and paratyphoid fever in Spain was considerably increased by the disorders due to the civil war (cf. table I), after it had been very small during the past decade. In 1938 it amounted to almost 1 % of the total mortality rate. In contrast to France, which shows a continuous decrease, the typhoid mortality rate is still very high. While in 1930 the typhoid mortality in France was 4.0 % for 100,000 persons which dropped to 2.5 % before 1936, in Spain it was still as high as 11.2 % for 100,000 persons in 1935.

Table 1.

Mortality of Typhoid and Paratyphoid Fever in Spain.

Year	Number of cases	Year	Number of cases
1931	3599	1937	4671
1932	3114	1938	4586
1933	3269	1939 1)	2471 1)
1934	3109	1940	•
1935	2804	1941 2)	1790 2)
1936	2601		

Footnotes:

1) For the first half of the year.

2) Except for the following weeks: 22/6 to 4/7, 10/8 to 16/8 7/9 to 27/9, 26/10 to 7/11 and 16/11 to 31/12

• = no data available.

Table 2.

Typhoid Fever in Spain.

Provinces	Cases 1941	Cases calc.per 1000 inh.	Death 1934	Death 1941
Alava	116	1.1	6	6
Albacete	81	0.24	46	15
Alicante	443	0.80	161	46
Almeria	221	0.66	37	18
Avila	161	0.72	30	.
Badajoz	981	1.36	103	61
Barcelona	1520	0.78	362	224
Burgos.	62	0.17	40	5
Caceres	799	1.73	96	39
Cadiz	1204	2.43	38	125
Castellon	191	0.62	66	21
Ciudad Real	267	0.52	77	12
Cordoba	455	0.65	117	52
Coruna (La)	193	0.25	45	27
Cuenca	249	0.79	53	16
Gerona	276	0,85	58	19
Granada	795	1.19	84	101
Guadalajara	181	0.89	36	14
Guipuzcoa (S.Sebast).	156	0.50	29	11
Huelva	476	1.32	45	35
Huesca	159	0.66	46	6
Jaen	892	1.27	117	96
Leon	202	0.45	61	6
Lerida	395	1.26	66	28
Logrono	288	1.39	28	10
Lugo	135	0.29	34	14
Madrid	931	0.63	98	58
Malaga.	1281	2.04	63	133
Murcia	490	0.76	77	43
Navarra	403	1.15	33	31
Orense.	414	0.96	43	30
Oviedo	185	0.23	16	34
Palencia.	159	0.75	31	8
Pontevedra.	600	1.04	65	40
Salamanca	266	0.77	63	4
Santander	509	1.36	24	26

Table 2 (cont'd).

Province	Cases 1941	Cases calc.per 1000 inh.	Deaths 1934	Deaths 1941
Segovia	164	0.93	22	15
Seville	689	0.83	103	82
Soria	230	1.46	26	9
Tarragona	485	1.39	55	49
Teruel.	169	0.67	26	13
Toledo.	134	0.27	59	9
Valencia.	903	0.84	226	85
Valladolid.	255	0.83	28	15
Vizcaya	333	0.66	20	27
Zamora	215	0.76	27	12
Zaragoza	659	1.20	59	39

Table 3.

Mortality from Typhoid and Paratyphoid Fever in Portugal.

District	1933 number of cases	1933 calc. per 1000 inh.	1940 number of cases	1940 calc.per 1000 inh.
Aveiro	59	0.16	73	0.19
Beja	26	0.18	74	0.30
Braga	67	0.16	55	0.13
Braganca	63	0.34	75	0.40
Castelo Branco	45	0.17	126	0.47
Coimbra	53	0.20	74	0.19
Evora	22	0.12	46	0.25
Faro	59	0.20	83	0.27
Guarda	50	0.19	92	0.34
Leiria	50	0.16	116	0.37
Lissabon	174	0.19	166	0.18
Portalegre	13	0.08	33	0.20
Porto	132	0.16	133	0.16

Table 3 (cont'd).

District	1933		1940	
	number of cases	calc. per 1000 inh.	number of cases	calc. per 1000 inh.
Santarem	70	0.16	74	0.17
Setubal	61	0.26	30	0.13
Viana	17	0.07	24	0.13
Vila Real	38	0.15	75	0.30
Viseu	61	0.14	67	0.15
Portugal (Continent)	1108	0.17	1416	0.22

The same disadvantageous conditions also exist in Portugal, where the typhoid mortality amounted to 16.1 % for 100,000 persons in 1935, which was increased in 1940 to 22.4 %.

The first survey on the geographical distribution of the typhoid and the paratyphoid fevers throughout the Iberian peninsula for the time being can only be given by the reproduction of the morbidity rate in the various provinces of Spain. The number of persons sick with typhoid fever in 1941 was calculated for 1,000 and the figures inserted in the chart of the administrative districts. For Portugal the conditions of the year 1940 are taken as a base.

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TRACHOMA IN THE MEDITERRANEAN AREA.

Translation prepared by:
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Trachoma occurs everywhere on the globe. There is probably no country in which this disease is completely unknown. One must, however, make on principle a difference between its occasional occurrence in individual cases, which have been chiefly carried in from so-called trachoma-countries, and its endemic spreading in large territories. Also here, there are differences in the frequency of occurrence. The "trachoma index" the percentage of the trachoma patients among the population, varies between 0,1 and nearly 100 %.

An absolutely reliable representation of the geographical spreading of trachoma is opposed by insurmountable difficulties. They lie in the character of this disease. Trachoma is an infectious disease, the course of which extends over many years. In the beginning, it causes few complaints so that the greater part of the patients at first do not consult any doctor, particularly with the less civilized peoples. By this fact, a number of cases is not officially ascertained, particularly since spontaneous healings are quite frequent. Even in the countries where trachoma is one of the diseases liable to be reported (Germany, France, Italy, Switzerland, Soviet-Russia, Spain, Turkey, Hungary, Algeria, Morocco), not all cases are known. This is associated with the fact that the diagnosis of trachoma is difficult, particularly in the beginning. Some cases are not recognized at all or diagnosed by mistake as harmless diseases of the coniunctiva tunica, e.g. follicular catarrh.

Despite these difficulties, one has persisted in the endeavour to determine, at least approximately, the numbers of trachoma patients of a certain region and to compare the trachoma indices of various countries with each other. One must calculate the trachoma index indirectly from other data of numbers. There are available as such data:

1. Official statistics in those countries, where trachoma is one of the diseases which must be reported,

2. the results of serial examinations of school-children

3. the reports of recruiting examinations

4. occasional serial examinations of single more or less characteristic groups of the population,

5. reports of ophthalmical clinics on the numbers of the treated trachoma-patients, as contrasted to the numbers

of other eye-patients,

6. the numbers of the trachoma patients known to practizing ophthalmological surgeons and general surgeons,

7. estimates of the numbers of the trachoma patients by surgeons well acquainted with the respective country,

8. the proportion of the trachoma among the causes of blindness.

Among these possibilities of computing the trachoma index, those are most reliable that are not based on chosen patients, such as the examinations of school-children and recruits. The trachoma figures of the ophthalmological clinics (nr. 5 of the mentioned list) can be judged in the same way. Just here, we possess rather detailed data in the literature. It must be considered, however, that the trachoma figures of the ophthalmological clinics depend on the conditions of civilization in so far as more patients with other diseases of the eyes and with refraction faults go to the ophthalmological clinics in a civilized country. According to WIBAUT, who studied these problems thoroughly, one finds the percentage of the trachoma patients in the population (a) by dividing the percentage of the trachoma patients among the patients of the ophthalmological clinics (b) by 3 (a = 1/3 b). Everybody who has occupied himself practically with trachoma statistics knows that the trachoma figures resulting from the official reports according to the regulation for reporting trachoma infections, are too low.

The present cartographic representation of the distribution of the trachoma is not based on only one source for all countries, but on the evaluation of the most varied possible data. The basis is the excellent critical elaboration of these problems by WIBAUT from the year 1929 (XIII Concilium ophthalmologicum 1929 Hollandia; Volume III).

It is supplemented by data from recent literature. According to WIBAUT's representation, the trachoma index is subdivided. The first group with the trachoma index 0 - 0,1 % comprises the territories which are practically free from endemic trachoma. The territories with a low trachoma index are subdivided more than those with a higher index, since in those, the data of numbers must be regarded as less reliable. On the whole, the distribution of trachoma does not depend on the political boundaries but, overlapping these, is more determined by the landscape and by the social and economic position of the population.

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DISTRIBUTION OF TRACHOMA IN SPAIN.

Translation prepared by:
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Technical Section (Medical)

According to the data of Prof. SORIA given at the XIII. International Congress of Ophthalmologists, 1929, a total of more than 55,000 trachoma patients has been counted in Spain. To control this national epidemic, a central trachoma control service (Servicio Antitracomatoso) was established in 1927 by the Spanish Department of the Interior, Public Health Section. If one compares the above mentioned data with the official figures for 1933 (according to the statistical year-book for Spain) and for 1935 (according to the report of the League of Nations) with 31,333 cases and 11,024 cases respectively, a decrease of the figures of the trachoma patients in Spain is observed. No recent statistical material for the time after the Civil War is available, though it must be assumed, according to general epidemiological considerations, that the epidemic is still endemic in the provinces on the Mediterranean coast, which have been most infected previously, such as the provinces of Almeria and Murcia, Granada and Alicante, Valencia and Castellon de la Plana.

Table 1

Distribution of Trachoma in Spain.

Provinces	According to Prof. SORIA's data at the XIII.Ophthalm.Congr. 1929		According to the Statistic. Year-Book XIX. Data for the year 1933	
	absolute figures	per 1,000 inhabitants	absolute figures	per 1,000 inhabitants.
Albacete	344	1.29	506	1.4
Alicante	2541	5.1	3284	5.9
Almería	6702	17.77	8648	25.7
Badajoz	2006	3.38	336	0.49
Cáceres	126	0.3	255	0.6
Cádiz	316	0.67	528	1.06
Castellón de la Plana	2960	9.18	2318	7.4
Jaén	555	1.05	554	0.79
Madrid	1785	2.03	270	0.18
Malaga	956	1.82	70	0.11
Murcia	12492	20.11	6872	10.62
Palencia	265	1.35	*)	*)
Taragona	472	1.39	*)	*)
Toledo	625	1.51	6	.
Valencia	11303	12.78	2499	2.3
Zaragoza	7087	16.8	*)	*)

*) no data available.

Table 2.

Trachoma Control Service in Spain.
(New trachoma cases in 1933 *)

Province	Advisory places in	Number of cases
1. Albacete	Branch-center for Rural Hygiene in Hellin	506
2. Alicante	Trachoma Control Institute of the capital of the province	247
	Albatera	538
	Altea	38
	Aspe	312
	Segura	369
	Crevillente	248
	Elche	168
	Georgos	50
	Orihuela	454
	Villajovosa	307
	Branch-center for Rural Hygiene in Alcoy	208
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prev. Trachoma Control Service)	344
	Tota	3284

* Data according to Anuario estadistico de Espana XIX ano 1934, Madrid 1935, page 819/20. Servicio Antitracomatoso: New cases of trachoma determined in 1933.

(Table 2)

(Trachoma Control Service in Spain)

Province	Advisory places in	Number of cases
3. Almeria	Capital of the Province	845
	Adra	1436
	Albox	2098
	Canjayar	23
	Carboneras	358
	Almanzora	157
	Huercal-Overa	52
	Torres	367
	Mojacar	318
	Nijar	187
	Mar	212
	Vera	413
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	2182
	Total	8648
4. Badajoz	Branch-center for Rural Hygiene in Merida	336
5. Caceres	Capital of the Province	34
	Branch-center for Rural Hygiene in Coria	117
	Trujillo	104
	Total	255
6. Cadiz	Capital of the Province (University Clinic)	208
	Chiclana de la Frontera	256
	San Fernando	130
	Branch-center for Rural Hygiene in Algeciras	134
	Total	528

(Table 2)

(Trachoma Control Service in Spain)

Province	Advisory places in	Number of cases
	Almazora	249
	Benicarlo	174
	Calig	104
	Nules	26
	Peniscola	131
	Vall de Uxo	210
7. Castellon de la Plana	Villarreal	203
	Villavieja	265
	Vinaroz	57
	Capital of the Province	169
	Branch-center for Rural Hygiene in Pozoblanco	247
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	483
	Total	2318
	Capital of the Province	1196
	Albunol	134
	Castell de Ferro	218
	La Mamola	360
8. Granada	La Rabita	431
	Motril	1008
	Terrenueva	155
	Ugijar	67
	Inspection of schools. factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	1081
	Total	4650

(Table 2)

(Trachoma Control Service in Spain)

Province	Advisory places in	Number of cases
9. Huelva	Provincial Institute for Hygiene	9
	Control Service of the Red Cross	20
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	20
	Total	49
10. Huesca	Branch-center for Rural Hygiene in Jaca	33
11. Jaen	Capital of the Province Branch-center for Rural Hygiene in Linares	554
12. Madrid	Ventas	175
	University Clinic	95
	Total	270
13. Malaga	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	70

(Table 2)

(Trachoma Control Service in Spain)

Province	Advisor places in	Number of cases
14. Murcia	Provincial Institute for Hygiene	285
	Institute for Youth Welfare	220
	County Hospital	227
	Aguilas	471
	Albatalia	265
	Algezares	383
	Cartagena	1114
	Cieza	730
	La Rava	128
	La Union	361
	Llano del Beal	125
	Lorca	612
	Mazarron	408
	Puente Tocinos	159
	San Anton	108
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	1277
	Total	6873
15. Toledo	Branch-center for Rural Hygiene in Talavera	6
16. Valencia	Alcira	502
	Cullera	118
	Gandia	699
	Sagunto	569
	Sueca	52
	Tabernes de Valldigna	178
	Inspection of schools, factories, work-shops, quarters of the poor, and communities (Prov. Trachoma Control Service)	381
	Total	2499

(Table 2)

(Trachoma Control Service in Spain)

Spain	Grand Total of New Trachoma Cases in the year 1933	30,878

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DISTRIBUTION OF POISONOUS SNAKES IN THE MEDITERRANEAN AREA.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

I. General Remarks.

The fauna of poisonous snakes of the Mediterranean Basin is especially interesting in that the particular conditions of three continents are united in a relatively small space. The distribution is in some instances in an apparent correlation with morphologic processes of past eras. In addition to several species of viperidae (adders), we also find a new representative of venomous vipers of which we only mention the dangerous proteoglyphous vipers (Elapinae), whereas the generally harmless opisthoglyphous vipers of the family of the Dipsadomorphinae which include the widely distributed species of Coelopeltis, Tarbophis, Psammophis and others will not be considered further in this place.

As is well known, poisonous snakes can only be distinguished from non-poisonous species by the presence of grooved (Elapinae) or pierced (Viperidae) teeth. The color of poisonous snakes is subject to wide variation and hardly furnishes any clues, the more so, since the smooth body apart from a possible contrast of the head or tail or a particularly cornified epidermal covering does not offer any mark for distinction. The unexperienced observer will, therefore very easily confuse the different species or even consider the possibility of a new species.

This explains the fact that the classification of European poisonous snakes is far from being clear. If one would go so far as to classify each local variety separately one would arrive at the grotesque result that the fauna of Southern Europe would boast of the greatest variety of poisonous snakes.

The distribution areas in Europe are determined with a considerably higher precision than is true for Asia and North Africa, where the possibility of exploration is not infrequently dependent on traffic conditions. A very dense network of observation in Europe is opposed by a very sparse one in Asia and Africa.

But even within the defined areas of distribution, the incidence of poisonous snakes is by no means uniform and is highly contingent on local conditions which must answer very definite requirements. Although the expert will be able to recognize the ideal habitat even in a landscape of largely the same character it must be borne in mind that these conditions vary and are not known well enough to be defined with accuracy.

Such factors as the thermal conductibility of the soil which is a function of the geologic substructure in connection with the water permeability and storage capacity, sun radiation and the amount of sun

during the summer months are of far greater importance to the European venomous snakes than for instance the intensity and duration of winter cold. This is confirmed by the incidence of pelias berus up to 67°' north latitude and in the high mountainous regions of the Mediterranean Basin. The development of the young animals is contingent on the presence of a definite type of prey which again require definite biologic conditions of their own.

MERTENS and MUELLER (1928) distinguish seven European types of vipers, which are subdivided into numerous species. SCHWARZ (1936) establishes two major groups, the "berus-" and "lebetina-" groups. The group of "ammodytes" stands out so clearly in the former category even externally by the prominence of the lips, that it seems advisable to distinguish at least between three groups, namely the vip. berus , vip. ammodytes , and vip. lebetina.

Thus the vipera berus and ursinii belong to the "berus" group, vipera aspis and ammodytes to the "ammodytes" group and the species and subspecies of vipera lebetina to the "lebetina" group.

The species which have advanced farthest northwards belong to the group of vipera berus, the distribution of which extends from the Atlantic Ocean through the North of Europe and Asia to the Pacific Ocean. South of this distribution area we observe a predominance of the vipera ammodytes family which is, roughly speaking, limited to the South of Europe. The distribution of the vipera lebetina group extends farthest to the south and east, from the North African coast of the Atlantic Ocean over the entire Mediterranean Basin to Western Turkestan.

Thus we have in the Mediterranean Basin to deal primarily with the ammodytes and lebetina families. The former is predominant in the north, the latter in the south and east of the Basin. The berus family appears only in sporadic inroads. The same is true for the representatives of the Cerastes and Echis family, as well as for the proteoglyphous vipers Naja and Walterinesia which are peculiar to the African snake fauna. Even representatives of the Bitis family were observed in the South of Morocco. The distribution limits are not in all cases well defined, especially in the south and east.

Generally speaking poisonous snakes are only active at night and hide out in day time or lie quietly in the sun for many hours and they are often dug into the sand except for the head. Only a very few species go out for prey in day time. It may therefore justly be said that encountering a venomous snake is not a very common event even in

hot countries where there are plenty of poisonous snakes. This will be quite understandable if one bears in mind that a quietly lying snake can hardly be distinguished in the contrast of glaring colors which is particular to the vegetation in hot countries.

Relatively few species live in the immediate vicinity of communities, among rubble at the fringe of the steppe. Representatives of these species sometimes do enter houses and apartments and are found betwen clothes, shoes or even hidden in the blankets of a bed.

The majority of venomous snakes live far away from human settlements, so that only members of certain professions such as farmers, forest workers, plantation workers, hunters, etc. will be endangered. The conditions may work out much more unfavorably for troops. Camping in the open air, combing of plantations and dense forests, combat in steppes and deserts definitely increase the likelihood of encountering venomous snakes. The fact that snake bites are relatively a rare occurrence even in countries with an abundance of venomous snakes must be explained by the habitat of the animals, the majority of which will bite only if suddenly disturbed.

In contrast to the venoms of the viperidae which cause hemotoxic effects and cell destruction, the venoms of the proteoglyphous Colubrides are complexes with neurotoxic effects. The vipera berus bosniensis is an exception; though a representative of the viperidae family the neurotoxic action is prevalent in their venom.

For clinical purposes it is always advantageous, though not imperative, to know which type of venom is involved so that the proper anti-venom can be administered. But the polyvalent anti-venoms have shown good results especially in bites of European snakes the venoms of which are less potent than those of tropical or subtropical regions. As anti-venoms against the bites of European venomous snakes one can use: The Marburg Ammodytes-Serum (Behring-Werke) or the anti-venoms E R of the Pasteur Institute or Vienna Serotherapeutic Institute.

Against the bites of African snakes in the Mediterranean Basin, the anti-venom A N of the Pasteur- Institute as well as monovalent anti-venoms such as the Marburg Bitis- or Naja-Serum have proved very successful.

II. The venomous Snakes of the Mediterranean Basin.

(In consideration of the available space only the landscape where the snakes were encountered are mentioned instead of the exact localities. A detailed report on the incidence of European vipers is contained in the "Mitteilungen of the Behring Works", Vol. 7, 1936, which in many points have served as a guide. For the sake of a better legibility of the map and because of the uncertainty with regard to the distribution areas only the general distribution areas were presented in the map.)

The fauna of poisonous snakes of the Mediterranean basin consists of the following species: Vipera, Cerastes, Echis, Bitis, Naja, and Walterinnesia with 26 representatives.

A.) Species of Viperidae.

a) the Berus family includes:

1. Vipera berus berus L.
2. Vipera berus bosniensis Boettger
3. Vipera seoanei Lataste
4. Vipera ursinii ursinii Bonaparte
5. Vipera ursinii macrops Mehely
6. Vipera ursinii renardi Christoph
7. Vipera ursinii Kaznakowi Nikolsky

b) the Ammodytes family includes:

8. Vipera ammodytes aspis L.
9. Vipera ammodytes hugyi Schinz
10. Vipera ammodytes latastei Bosca
11. Vipera ammodytes ammodytes L.
12. Vipera ammodytes meridionalis Boulenger
13. Vipera ammodytes transcaucasiana Boulenger

c) the Lebetina family includes:

14. Vipera lebetina lebetine L.
15. Vipera lebetina xanthina Gray
16. Vipera lebetina mauritanica Guichenot
17. Vipera lebetina deserti Anderson
18. Vipera lebetina raddei Boettger

B.) Species of Cerastes.

19. Cerastes cornutus Forsk.
20. Cerastes vipera L.

C.) Species of Echis.

21. Echis carinatus Schn.
22. Echis coloratus Boulenger

D.) Species of Bitis.

23. Bitis arietans Merr.

E.) Species of Naja.

24. Naja haje L.
25. Naja nigricollis Rhdt.

F.) Species of Walterinnesia.

26. Walterinnesia aegyptiaca I.

The distribution of the above species is not clearly defined and two and more of them not infrequently occur in the same area. Bastard types are observed in the area where Vipera berus and aspis live together.

1. Species of Viperidae.

Group of vipera berus (common vipers).

This group has a very wide distribution from the coasts of the Atlantic to the Pacific and cannot be considered as a typical representative of the Mediterranean Basin, where its incidence is limited to numerous inroads which have developed special forms with special characteristics in well defined areas. We find for instance a variety which is especially adapted to the conditions of the steppe and which are encountered in moor and prairie land. The different distribution areas do not infrequently merge into each other and are in some instances superimposed.

The moor- and prairie land types prevail in Europe north of the Alps, in the post-glacial moraine land as well as in the low and moorlands of northern Europe, the foreland of the ice streams of the glacial

era. From these main areas the vipers have spread to all regions which appealed to them and the species disappeared only in the most highly civilized areas.

1. Vipera berus berus L., the common viper. In addition to the areas of distribution as mentioned above, this representative is also to be found in mountainous regions, sometimes even up to a considerable altitude as in the Alps, where places grown with alpine roses in the vicinity of alpine pastures and rocky ledges are the favoured habitat. These conditions are fulfilled in numerous valleys in Switzerland, especially in an eastward direction. On the other side of the Alp passes we find this species also in the valleys sloping to the South and in Italy as far south as Padua and Ferrara. In Germany the common viper is widely distributed in the central mountainous districts, whereas it has completely disappeared in the densely populated Rhineland. In the eastern frontier region, the incidence is rather high in certain places and we find them also in Tyrol, Styria, Kaernten and Krain. On the Balkan Peninsula the distribution even extends farther south to the Vitos and Rhodope Mountains and eastwards it includes the Bucowina and Moldavia. Although vipera berus is encountered in Macedonia, we do not find this viper in Thrace. This species is well known in France, apart from some areas in the southwest.

2. Vipera berus bosniensis Boettger. The Balkan viper invites special attention, the venom of this species develops mainly neurotoxic effects which is in contrast to the venoms of all other viperidae. This fact has no special therapeutic importance since the ammodytes serum of the Behring Werke is also effective against this venom.

The distribution of the Balkan viper includes the northwest of the Balkan Peninsula, from the rocky region of Croatia extending to Bosnia, Hercegovina, Slavonia and Albania. The limits of its distribution are not yet well defined in all instances. The Morava-Wardar line seems to limit its distribution to the East. The limits to the South and Northwest are not yet defined. In the North the distribution area extends in some parts up to the Danube.

3. Vipera berus seoanei Lataste. The Iberian viper is only to be found on the Pyrenean Peninsula and only in the North and Northwest. It is mainly distributed in the Asturo-Cantabrian mountains, in the provinces of Asturias and Galicia and it is also known in Portugal. Distinct mountainous varieties are observed in altitudes of more than 800 M., above the timber line.

The group of the vipera ursinii L. includes different varieties, namely the Steppe viper, the Meadow viper and the Caucasian viper.

4. Vipera ursinii ursinii Bonaparte, this representative which is named Wiesenotter in German, which means Meadow viper, is mainly distributed in the Hungarian lowlands and is to be found from the south bank of the Danube and as far westwards as Melk in the vicinity of Vienna. In the east the distribution is limited by the Theiss river and specimens were found in Siebenbuergen. Two isolated distribution areas were reported in the Abruzzo mountains and in the western part of the French Alps which must be interpreted as relicts indicating a formerly larger distribution of this species.

5. Vipera ursinii macrops Mehely, the Karst Viper. This representative has roughly speaking the same distribution area as the Balkan Viper and is found in Bosnia, Hercegovina, Montenegro, North Albania and as far eastwards as to the area of Sofia (Lylin Mountains). The venom of this viper, as is the case with the Balkan Viper, has mainly a neurotoxic effect but this statement by REUSS still requires careful examination before far reaching conclusions may be drawn from this surprising resemblance of the effect of the venoms of these two representatives.

6. Vipera ursinii renardi Christoph, the Steppe viper, is distributed in north Bulgaria and in the west in Bessarabia, Crimea and area of the lower Volga including all the Russian steppes of central Asia up to the Altai. In the south the distribution extends to the Caucasus, to the plains of Aras and Kura including Armenia where this species was found as far south as Eriwan. It may, therefore, be said that this species does not count among the more important representatives of the Mediterranean Basin.

7. Vipera ursinii kaznakovi Nikolsky is distributed in the medium altitude regions of the Caucasus countries. In the East Caucasus and in the plain of Kura, however, the species could not be proven. The incidence of this viper, as is the case with all vipers particular to the Caucasus, is thus limited to a relatively small area.

Group of the Vipera ammodytes:

This group is especially distributed in the areas bordering the Mediterranean Basin. The different representatives of this group are

distributed as follows:

8. Vipera ammodytes aspis L., the "Viper" properly speaking is found throughout Italy and the distribution extends far to the north and northwest of the Apennine Peninsula. In an eastward direction the distribution does not go beyond the Isonzo river. In the northeast this species is found in the valleys of the Alps, especially in Graubuenden and the incidence is on the increase the farther we go to the west. In one place at Thiengen it crosses the Rhine. It is rather frequent in the Jura and Vosges mountains up to the region of Metz in Lorraine, all over France, as far west as Abbeville. In southern France the species is distributed as far as the Gironde river and in the Vendee province as well as in the eastern foreland of the Pyrenees and northeastern part of Catalonia. In Catalonia this representative lives together with the Latastei family. In the Alps the species is found up to about 2000 meters of altitude.

9. Vipera ammodytes hugyi Schinz, Hugy's viper, has a rather confined area of distribution and it only occurs in southern Italy and Sicily.

10. Vipera ammodytes latastei Bosca, also called "Stuelpnasenotter" because of the striking prominence of the upper lip, is distributed all over the Iberian Peninsula, furthermore in Algeria and Tunisia, where it is especially encountered in the shore districts, though it is also found in many instances deep in the country. So, the species was observed in the area of Marrakesch in the Atlas Mountains at an altitude of more than 2500 Meters.

The other representatives of the ammodytes family are not characterized by this prominence of the lip, although a slight indication of this particularity is present in some of them.

11. Vipera ammodytes L., also called the "Western Sand Viper" which is an absolute misnomer since the "sand vipers" never live in the sand. This species is characterized by an obliquely placed horn and a red tip of the tail. The main areas of distribution are the southeast district ofthe Alps, Dalmatia, Croatia, Bosnia and the Hercegovina. Representatives have also been observed in the mountainous districts of Istria . In Kaernten the distribution area extends as far as Friesach in the north. The species was also found in the area of Laibach. Furthermore there is a little area near Bolzano which represents a relict. Farther eastwards we find this family as

far as the Morava-Wardar line and in the north it was observed as far as the Transsylvanian Alps. It is worthwhile mentioning that there exists a red mutant of this species.

12. Vipera ammodytes meridionalis Boulenger, characterized by a vertically placed horn is distributed in areas south and east of the distribution area of the vipera ammodytes L. In some districts, as for instance in the areas of Valona both species live side by side. This species is found in Greece as far north as the Pelloponese, Bulgaria, Macedonia, in the Aegean and Ionian Isles, farther east it occurs in Asia Minor, Turkey and Syria.

13. Vipera ammodytes transcaucasiana Boulenger, the Armenian Sand viper, has the smallest distribution of the three species. It is limited to the area of the Caucasus, where it is found particularly in medium altitudes.

Group of Vipera lebetina:

This group includes mountainous species of hot and tropical climates with a distribution extending from Northwest Africa to India.

14. Vipera lebetina L., the Levant Viper. Of all the species of this group this representative has the widest distribution although the limits have not yet been established with certainty in all instances. The main distribution area is Iran and from there eastwards to Kashmir, northwards to West Turkestan and the areas of Amur-Darja and Syr-Darja. In the western extension the species was found in Transcaucasia as far as Batum. From Iran the distribution extends to Mesopotamia, where the species is known in the valley of the Orontes as far as Acre. In the southwestern section of Asia Minor the distribution area extends to Turkey as far as the area next to Adana. It is worthwhile mentioning that this species occurs on several islands of the Mediterranean Sea such as Cypros, Kimolos, Milos and Antimilos.

15. Vipera lebetina xanthina Gray, the Mountain Viper, is distributed in Asia Minor. This species is well known in the Taurus Mountains, in the mountainous districts of Syria and Palestine as far as the region of Jaffa, in Lebanon and from there northwards to Aleppo. It is thus an inhabitant of the Eastern part of the Mediterranean basin.

16. Vipera lebetina mauritanica Guichenot is also a distinct mountainous form. The Atlas Viper is especially distributed in the

northern part of the Atlas Mountains and the distribution area extends from there almost to the Atlantic Ocean. In an eastward direction this species was found as far as in the area of Tunis.

17. Vipera lebetina deserti Anderson, the Sahara Viper, makes an exception in that it does not live in the mountains but in the plains. This species is distributed in the desert areas of South Algeria as far as the area of Ain Sefra, it occurs at the northern fringe of the Sahara as far east as Tripoli. It is likely to occur in the Cyrenacea in Lybia and certain reports seem to indicate that it is also distributed in Egypt.

18. Vipera lebetina raddei Boettger, the Armenian Mountain Viper, has as all the species of the Caucasus only a very small distribution. This species is found in the area of the Kura and Aras mountains. Since the distribution lies outside the map it could not be entered.

2. Species of Cerastes.

19. Cerastes cornutus Forsk, the Corn Viper, is one of the most generally distributed venomous vipers of North Africa which lives in the outskirts of the stony deserts. The distribution area extends from the northern outskirts of the Sahara from Algeria to the east by way of Lybia as far as Egypt. It is found from Arabia to South Palestine and South Syria.

20. Cerastes vipera L., the Avicenna Viper is a small type venomous viper which lives in North Africa, in Algeria up to the Egyptian border in the deserts and sand dunes. It is also found in South Tunisia in the area of Douirat, in Tripoli, in the desert of Gizeh, in Egypt and also west of the Suez Canal.

3. Species of Echis.

21. Echis carinata Schn., the Rustling Sand Viper has this name because of the slight rustling noise made when gliding over the sand. This species is rather widely distributed in West Africa in a girdle with the width from Algeria to Togo including Egypt, Abyssinia, Somaliland, part of Arabia and Iran. We find it also in Transcaspian area and also in India.

22. Echis coloratus Boulenger strictly considered does not belong to the fauna of the Mediterranean basin. It is also mentioned in this

connection because specimens were found in southern Morocco in the area of Wadi Sous.

5. Species of Naja.

24. Naja haje L., the Aspis Viper (must not be confused with Vipera aspis) is one of the most dangerous venomous vipers which is encountered in the northern part of the Sahara from Morocco to Egypt, up the Nile as far as Mozambique, in Somaliland, furthermore in the south of Palestine and northwest Arabia. It is also found rather often in the district of Maryut, Gizeh, Fayum, Tel el Amarna, Beni Hassan.

25. Naja nigricollis Rhdt. is distributed in the south, particularly in Transvaal, Natal, Angola, Betschuanaland and all over west Africa, furthermore in upper Egypt where it was found at Assuan.

6. Species Walterinnesia.

26. Walterinnesia aegyptiaca which is closely related to the species of Naja is a very rare venomous viper which has been found so far in Egypt up to Iran.

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The number of venomous vipers to be met with in the Mediterranean Basin thus appears to be rather important. As far as the different species in the European part of the Mediterranean Basin are concerned, it may be said that these belong to a few well defined families with a certain number of sub-families. A distinction of the different venoms made it possible to develop a specific therapy in each case. This distinction had to begin with a classification first of the local forms of snakes and then to extend the circle wider and wider. This consideration imparts some understanding for the importance of systematic zoologic classification even to the layman. It will become evident how minute and seemingly unimportant observations fit into a general picture which one day will be viewed from an entirely different angle and gain considerable practical importance.

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PRECIPITATION AND ISOTHERMS IN THE MEDITERRANEAN BASIN

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

The map of the precipitation and isotherms in the Mediterranean basin shows on the same map the distribution of the precipitation throughout the entire Mediterranean basin, some selected isotherms of the months of January and July, and through climograms the annual course of the precipitation, the temperature, and the relative humidity. This map was compiled on the basis of the information material studied and the latest maps available.

The Mediterranean basin is a very homogeneous meteorological area whose various parts show only certain variations of the same type of climate, the so-called Mediterranean climate. The term etesian which frequently is used to describe the Mediterranean climate originates from the northwestern winds, the so-called etesians which predominate in the eastern Mediterranean during the hot season, and the name of which was applied to the entire Mediterranean climate. The characteristic properties of the Mediterranean climate are a bright, dry summer, and a mild winter during which the maximum of the precipitation is observed. During winter the weather is rather unstable, about as unstable as in central Europe during summer. This climate which is so different during summer and winter is due to the shift of the subtropical Azores high. In summer the Mediterranean basin usually is under the influence of the subtropical high with its bright weather. During winter, however, when the subtropical high is shifted to the south, the Mediterranean basin comes under the influence of the central European west wind zone north of it and therefore shows the unstable character of weather.

The proper Mediterranean climate with the maximum of precipitation in winter which is confined to the southern parts of the Mediterranean area, that means to Africa and to the coasts of the peninsulas suffers a certain modification towards the north and in the interior of the peninsulas by the fact that there the maximum of rainfall occurs in the autumn and spring months. Thus a link is brought about to the central European meteorological area in the north with its summer rainfalls. As a consequence of the small amount of precipitation the coast of southern Tunis and Palestine have a steppe climate.

W. KOEPPEN made an attempt to give a cartographical presentation of the various types of climate by recording the limit values of temperature and the types of precipitation (see Map VII/1, Undulant fever in the Mediterranean basin). According to this author the entire area considered here is located between the isotherms of 18° C. and -3° C. in the coldest month. In addition he distinguishes between the areas dry in summer and areas with the maximum of rainfall in the early summer or with rainfalls during all seasons and finally he defines the etesian climate through the 22° C. isotherm of that month which shows the highest temperatures. Hence, in the climate map available the course of the 22° C. July isotherm shows the northern boundaries of the etesian climate. With the exception of Africa a July temperature of 26° C. is found only in the southernmost coasts of Greece, Crete, and Turkey, and in Spain in the river basin of the Guadalquivir near Sevilla. A mild winter is characteristic for the entire Mediterranean basin. The January isotherm of 0° C. is exclusively found in the higher regions, while in the coastal areas the January temperature is above 6° C.

The annual amount of precipitation in the Mediterranean basin differs considerably. Within very small areas very great differences are frequent, dependent on the location of the areas in relation to the winds commonly bringing the rain. As the western winds usually bring the rain with them, the western and southern coasts of all peninsulas show the highest values of precipitation, while the interior is much more arid. Contrary to that in North Africa the northern coast facing the Mediterranean shows the highest number of rains. There are considerable contrasts in Spain where the precipitation in the northwest exceeds 1,500 mm., while in the eastern territories of Spain it only amounts to 300 mm. In addition a region with more than 3,500 mm. precipitation is located on the eastern shores of the Adriatic, an area which is considered as the region with the greatest number of rain in Europe, while on the other hand southern Russia is one of the areas with the smallest amount of precipitation.

The climograms on the margin of the map give a survey of the annual course of some of the meteorological elements (the names of the stations for which a climogram was given, are underlined). In the entire area studied (solid curve) the temperature conditions show the greatest homogeneousness during summer. The usually hot summer is followed by a warm autumn as a result of the heat storage in the Mediterranean. The winter of the borderline areas is mild while the temperature decreases towards the interior of the land areas. Spring is relatively cool, as due to the proximity of the cold water surface the rise of the temperatures is very slow.

The annual course of the precipitation shows very different types. The etesian climate type with the dry summer and the maximum precipitation during winter is found in the stations of Alexandria and Palermo. Scutari is an example for the zone with a summer of little rainfall and the maximum of precipitation during spring and autumn, while for instance Bucarest is characteristic for the northern territories with the principal precipitation period during summer.

The annual course of the relative humidity is represented by a broken line. The stations in the immediate proximity of the Mediterranean, such as Livorno, Palermo, Alexandria show the smallest variations for the different months. In the stations which are located farther in the interior local conditions exercise some influence, so that variations of 30 to 40 % occur. Generally the minimum is observed during summer.

Weather Forecast Service
(Air Force)

YELLOW FEVER

IN AFRICA

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

The reports on morbidity and mortality (see Table I) give only a vague idea of the distribution and frequency of yellow fever, because within endemic occurrence experience has shown that slight cases are far more frequent than typical ones but have such an uncharacteristic course that they cannot be recognized clinically. Thus, there are wide "mute regions of yellow fever" in which outbreaks of yellow fever are possible under certain conditions, such as the sudden arrival of numerous non-immune and thus susceptible persons. These regions could be precisely limited by serial examinations among the population,

Table I

Reported cases of yellow fever in Africa 1935-41
(A second figure in brackets indicates the fatal cases, if reported separately)

	1935	1936	1937	1938	1939		1940	1941
French Colonies								
Senegal	1	12	36	2	-			
Guinea	-	1	-	-	-			
Ivory Coast	7	1	8	14	8			
Togo	3	-	-	-	1		3(1)	49
Dahomey	2	4	1	1	-	19		
Sudan	1	5	3	4	-			
Niger	1	1	-	-	3			
Equatorial Africa	2	-	2	2	4		2(2)	4
British Colonies								
Brit. Gambia	1	-	-	-	-		-	-
Nigeria	1	3	3	-	10(5)		-	-
Sierra Leone	1	-	1	-	-		-	
Gold Coast	7	4	11	1	-		2(1)	1
Uganda	-	-	2	-	-		-	1
Sudan	-	-	2	-	-		15,000(1,660)	?
Belgian Congo							1	2
Spanish Guinea							4	4

by means of the mouse protection test, which are available in large numbers for the years 1933-38. The map of the distribution of yellow fever immunity in Africa shows the results of these examinations, Table II gives the particulars. It must be considered that, of course, the map

shows only data of those places which have been examined, i.e. few entries such as in the region of the Ivory Coast do not mean that no yellow fever can occur there, or conversely numerous entries, such as in Nigeria, do not mean that yellow fever is distributed there more densely than in the regions which have been less well examined.

With yellow fever, we are in the extremely favorable position of possessing, in the mouse protection test, a certain method of proving infection of yellow fever, since it does not only become positive after any infection of yellow fever (even after "occult immunization"), but also remains so during the whole lifetime of the respective person. Thus, negative reaction does not only mean that the respective person is susceptible to yellow fever, but also that with great probability he has never suffered from an infection of yellow fever in his life. Under these conditions, the systematic serial examinations with the mouse protection test have given an exact picture of the distribution of yellow fever virus at that time. The result shows that yellow fever is much farther distributed than suspected previously, particularly in the interior of the continent. After attention had been once awakened by these examinations, cases of yellow fever have been clinically and autoptically recognized in some mute zones, particularly in the Anglo-Egyptian Sudan. Just there, yellow fever has advanced recently toward the northeast, which had been already suspected on account of former immunity findings (see the last available reports about cases of 1940). Its future distribution cannot yet be estimated (cf. Sudan in table I).

If the results of the mouse protection test among a population are subdivided into age groups, it can be seen whether yellow fever still exists, namely, if also the little children have positive reactions, or whether yellow fever is extinct in the respective region; for it must have been extinct for so many years that the most recent positive case is old (except possible positive persons immigrated in the meantime). Thus, the mouse protection test affords some - even if only limited - insight into the dynamics of the epidemic. On the present map and the respective table, differences have been made between groups above and below 15 years.

During the mouse protection test, patient serum and virus containing mouse brain are mixed and after a first phase of binding, decreasingly diluted if necessary, intracerebrally injected to living mice (5-6 white mice per serum!). If the serum contains sufficient protective substance, the mouse remains healthy (positive), if it contains none, it dies within seven days at the most (negative).

Table II

Occurrence of Yellow Fever Immunity in Africa

The figures in brackets behind the names of the regions indicate the source of the literature from which the data have been taken (see end of table). The figures before the places correspond to those on the map.

Column A: Number of persons examined
Column B: Percentage of juveniles younger than 15 years with positive mouse protection test
Column C: Percentage of persons older than 15 years with positive mouse protection test

No groups of age have been distinguished where the figures stand between B and C.

	A	B	C
Morocco (3)			
1. Casablanca	24	-	0
2. Fes	17	-	0
3. Rabat	45	-	0
Algeria (3)			
1. Oran	28	-	0
Tunisia (3)			
1. Tunis	25	-	0
Senegal (4)			
1. Tivaouane		38	
2. Pout		35	
3. Fadioudyo		15	
4. Sabaya		6	
Guinea (4)			
1. Kaukau		0	
2. Kouroussa		0	
3. Siguiri		10	
4. Conakry		0	
5. Boffa		0	
6. Boke		0	

	A	B	C
Sudan (4)			
1. Taya		15	
2. Quio		20	
3. Kiranga		37	
4. Sokoto		0	
5. Toukoto		0	
6. Kayes		28	
7. Dinguira		47	
Sudan (1)			
8. Ansongo	50	0	0
9. Gao	80	0	0
Niger (1)			
1. Agadez	86	2	0
2. Birnin N'Koni	25	20	-
3. Dogondoutchi	25	36	-
4. Dosso	25	0	-
5. Gaya	50	64	92
6. Goure	30	3	-
7. Maradi	27	0	-
8. Niamey	54	0	35

(Niger (1) ctd.)	A	B	C
9. Tessaoua	51	50	52
10. Tillabery	25	0	-
11. Zinder	83	0	44
Brit.Gambia(1)(8)			
1. Bathurst	23	26	0
	36	45	0
2. Basse	53	19	
3. Georgetown	45	23	35
	49	28	
4. Kerewan	38	32	
5. Bakau	45	29	
6. Brikama	44	2[illegible]	
Sierra Leone (1)			
1. Bo	15	0	-
2. Freetown	73	3	23
3. Makene	23	9	-
4. Moyamba	25	24	-
5. Segbwema	13	-	8
Gold Coast (1)			
1. Abetifi	20	5	-
2. Accra	25	8	-
3. Adeiso	24	27	-
4. Asamankese	25	40	-
5. Bawku	50	12	56
6. Bole	25	24	-
7. Cape Coast	24	29	
8. Dodowa	26	24	-
9. Effiduase			
Town	25	0	-
County	23	0	-
10. Yamasi	14	7	-
11. Kintampo	14	7	-
12. Korforidua	25	24	-
13. Kumasi Town	25	0	-
" County	23	0	-
14 Larteh, Upper	27	30	-
15. " Lower	25	0	-
16. Lawra	25	52	-
17. Mampong			
(Akwapim)	20	0	-
(Northern Territories)	26	0	-
18. Mpraeso	8	0	-
19. Navrongo	50	40	72
20. Nkawkaw	8	0	-
21. Nkawatia	16	0	-
22. Obo	9	9	-
23. Obomen	14	0	-
24. Salaga	38	26	-

	A	B	C
25. Saltpond	25	4	-
26. Sekondi	25	4	-
27. Swedru (1930)	25	0	-
(1932)	25	16	-
28. Tamale	25	8	-
29. Tumu	25	16	-
30. Wa	50	32	60
31. Yeyi	25	36	-
Nigeria (1)			
1. Abeokuta	122	54	49
2. Abinsi	25	0	-
3. Ado	51	56	84
4. Agaie	10	20	-
5. Aiyetoro	11	64	-
6. Akinmori	21	14	-
7. Akure	50	0	8
8. Akwanga	25	0	30
9. Andaha	26	0	5
10. Argungu	50	0	24
11. Awe	19	5	-
12. Bauchi	62	8	36
13. Baradugi	20	15	-
14. Baro-Koroko	17	0	20
15. Bida	40	68	7
16. Birnin Gwari	42	12	48
17. Birnin Kebbi	50	4	24
18. Biu	25	12	-
19. Budon	21	0	30
20. Calabar	24	13	-
21. Deladegum	18	11	44
22. Daura	52	4	29
23. Dinamari	5	-	20
24. Ede	25	28	-
25. Egan	53	6	6
26. Enipata	30	23	25
27. Etsum-Mutum	26	12	22
28. Forum	33	0	4
29. Gadau with small villages	48	8	16
30. Garkida	25	28	-
31. Gowia	17	0	38
32. Gorgorum	98	0	7
33. Gumel	50	44	60
34. Gusau	23	4	-
35. Hadejia	78	39	28
36. Ibadan	524	42	61
37. Ife	50	70	-
38. Ijebu Ode	26	15	-
39. Ilaro	50	48	-

(Nigeria (1) ctd.)	A	B	C
40. Ilesha	25	4	-
41. Ilorin	175	10	82
42. Iseyin	23	57	-
43. Iwo	25	20	-
44. Iyo	10	30	-
45. Jamota	25	0	-
46. Jarmari	6	16	
47. Jebba	50	26	38
48. Jega	49	3	0
49. Jos	79	8	23
50. Kaduna	50	2	-
51. Kakuro	11	100	
52. Kano	125	7	20
53. Katagum	18	17	0
54. Katsena Ala	15	33	
55. Katsina	75	0	17
56. Kazaure	56	4	7
57. Kontagora	26	61	-
58. Koton Karife	37	13	13
59. Kujama	33	9	85
60. Kuru (Vom)	3	0	0
61. Lagos	40	9	25
62. Lassa	25	29	18
63. Lokoja	76	12	45
64. Maiduguri	30	17	-
65. Makawa	16	0	8
66. Makera	27	4	-
67. Makintari	6	67	-
68. Malumri	4	-	50
69. Mamfe	23	50	56
70. Mamfe county, villages	121	18	34
71. Marama	20	5	-
72. Medachi	9	33	
73. Meko	54	50	-
74. Menoko	17	0	25
75. Mkar	43	24	22
76. Muroji	50	12	20
77. Musuman	10	20	
78. Muye	25	8	0
79. Numan	25	20	0
80. Ogbomosho	225	12	64
81. Ogudu	25	16	-
82. Okene	84	8	4
83. Oke Iho	27	48	-
84. Ondo	50	8	4
85. Onitsha	55	0	36

(Nigeria(1)ctd.)	A	B	C
86. Oshogbo	50	60	-
87. Owerri-Okigwi	119	0	16
88. Owo	50	0	12
89. Oyo	173	11	71
90. Pategi	62		8
91. Potiskum	25	0	-
92. Rigachikum	47	5	32
93. Sabongari	36	14	82
94. Sansita	11	0	16
95. Sawo	10	30	-
96. Shaki	50	50	-
97. Shongo	44	27	82
98. Sokoto	51	12	30
99. Sokwa	20	0	21
100. Takalafiya	57	27	67
101. TellataMafara	50	0	-
102. Tambawel	49	0	12
103. TarabbaGongi	10	30	-
104. Tashana	20	0	10
105. Toshegwa	10	50	
106. Tinto(Mamfe)	11	27	-
107. Toro	17	-	12
108. Tsakuwawa	50	38	46
109. Tudan Wada	23	5	-
110. Vom	69	0	2
111. Wajagal	50	12	44
112. Wakame	25	24	
113. Wallidizene	30	6	43
114. Wana	25	13	33
115. Warri	21	19	-
116. Wukari	15	13	
117. Yabo	49	0	4
118. Yandev	56	33	36
119. Zareku	83	26	58
120. Zaria	154	1	9
121. Zuru	29	0	25
Liberia (1)			
1. District 1	34	-	15
2. " 2	6	-	0
3. " 3	7	15	
4. Cape Palmas	24	0	
5. Ganta	25	-	0
Ivory Coast (4)			
1. Benikoro		0	
2. Darsalam		20	
3. Dedougou		0	

(Ivory Coast(4))	A	B	C
4. Dangouadougou		0	
5. Gaoua		33	
6. Gd.Passam		10	
7. Kamalo		0	
8. Kampti		0	
9. Kayo		10	
10. Kirango		35	
11. Kouara		0	
12. Koutiala		30	
13. Leo		15	
14. Mbossoba		50	
15. Mokby		60	
16. Noumoudara		20	
17. Omic		15	
18. Ouagaladougou		110	
19. Pabre		25	
20. Po		0	
21. Sabou		10	
22. Sikasso		0	
23. Tehini		0	
24. Tenkodogo		10	
Togo (4)			
1. Palime		20	
Dahomey (1)			
1. Abomey	40	60	93
2. Kandi	50	8	12
3. Parakou	25	8	-
4. Porto Novo	48	29	-
5. Save	25	24	-
French Congo (6)			
1. Poto-Poto	39	12	36
2. Bacongo	34	40	26
3. Pointe Noire	47	46	35
4. Loango-D.	45	15	32
5. Bakouilou	5	-	0
6. Kayes	32	6	19
7. Tiena	6	-	0
8. Sine-Bamba	18	0	25
9. Chilounga	27	10	0
10. N'Tima	24	8	17
Chad (6)			
1. Abeche	16	0	7
2. Tinam	15	7	-
3. Abou-Deia	10	60	-
4. Mongo	18	44	-
5. Massenia	22	50	-
6. Melfi	9	55	-

(Chad(6)ctd.)	A	B	C
7. Bousso	20	25	-
8. Bongor	19	0	-
Gaboun (6)			
1. Port Gentil	45	19	27
2. Lambarene	24	14	21
3. Vega	17	33	0
4. Bellevue	30	0	6
5. N'Sagha	16	25	8
6. Mayennic	5	0	0
7. Aniog: hes	9	0	0
8. Libreville	24	0	20
9. Abenelang	26	0	0
10. Zog'M'Bour	20	0	8
11. Coco Beach	29	36	28
12. M'Bouc	10	-	10
13. Oyem	5	-	20
14. Mouila	5	-	0
15. Chibanga	5	-	0
16. Divenie	5	-	20
French Equatorial Africa(2)			
1. Balhois	32	0	23
2. Bambari	50	28	60
3. Bangassou	50	20	44
4. Bangui	50	4	32
5. Berberati	49	8	21
6. Boda	49	12	72
7. Bouka	49	24	68
8. Bousso	50	12	56
9. Kimboalla	40	12	12
10. Joko	20	5	-
11. Carnot	49	32	54
12. Dongou	50	0	8
13. Fort Archimbault	26	19	-
14. Fort Lamy	48	2	-
15. Fort Sibut	50	12	36
16. Impfondo	47	18	24
17. Kinkala	50	0	24
18. Libreville	45	0	20
19. Liranga	50	8	12
20. Loudima	50	0	8
21. Loukolela	35	0	0
22. Loungba	25	-	52
23. Madingou	49	4	16
24. M'Baiki	50	0	24
25. Mindouli	25	4	-

(French Equatorial Africa(2)ctd.)	A	B	C
26. Mobaye	48	8	50
27. Moissala	50	0	12
28. Mossaka	32	0	-
29. Mouionzi	50	4	12
30. M'Pouia	50	0	12
31. M'Vouti	49	0	3
32. N'Gabe	50	12	24
33. Ouango	50	0	24
34. Port Gentil	35	0	6
35. Rafai	44	24	53
36. Sibiti	50	0	4
37. Zemio	47	36	95
Cameroons (2)			
1. Bafia	49	8	28
2. Batouri	50	4	16
3. Duala	50	0	0
4. Garua	50	0	-
5. Maroa	50	0	-
6. M'Banga	48	0	0
7. Nkongsamba	50	4	4
8. N'Goundere	50	-	-
9. Obala	99	0	1
Spanish Guinea(3)			
1. Oveng	45	-	18
2. Machinda	36	-	3
3. Bimbongo	10	-	0
4. SpanishGuinea total	91	-	10
Belgian Congo(2)			
1. Albertville	50	0	0
2. Banana	25	11	28
3. Banzyville	50	4	12
4. Basankusu "(Belge)	11	-	9
"(Benge)	15	-	7
"(Lilangi)	54	3	58
5. Basoko	50	-	16
6. Boma	50	0	24
"(Europeans)	12	-	0
7. Bondo	50	12	20
8. Buta	50	0	20
9. Coquilhatville	71	-	11
10. Dilolo	50	0	4
11. Elisabethville	50	0	0
12. Fradje	25	5	20
13. Kaiku-n-Zobe	32	3	-

(Belgian Congo(2))	A	B	C
14. Kimpangu	46	0	0
15. Kisongo	24	0	5
16. Kongolo	50	0	4
17. Kinsuka	17	-	12
18. Leopoldville	56	0	6
19. " environs	52	21	
20. Libenge	51	0	12
21. Lisafa	72	0	15
22. Lisala	47	-	17
23. Longo	13	0	29
24. Luebo	50	0	0
25. Luluaburg	50	0	16
26. Luozi	46	-	15
27. Maduda	24	0	-
28. Matadi	58	15	42
29. Minkono	17	-	47
30. Niali	16	0	-
31. Fort Francqui (Ileo)	22	-	18
32. "(Belgian)	21	-	0
33. Senge	13	-	0
34. Soyo-Luadi	38	14	30
35. Stanleyville	83	-	10
36. Thysville	56	-	0
37. Tshela	27	4	-
38. Tshikapa	50	0	8
39. Usumbura	50	0	0
40. Vista	19	0	17
41. Yema	2	-	0
Angola (2)			
1. Ambris	50	0	0
2. Ambrisette	50	0	0
3. Benguela	50	0	0
4. Canabatela	50	0	0
5. Catumbela	50	0	8
6. Catete	50	0	4
7. Caxito	49	0	0
8. Damoa	50	0	0
9. Dondo	50	0	0
10. Golungo Alto	50	4	0
11. Loanda	50	0	0
12. Malange	50	0	0
13. Maquela	50	0	0
14. Mossamedes	50	0	6
15. Muxima	50	0	8
16. Pungo Adongo	50	0	0
17. Novo Redondo	50	0	0
18. Sao Salvador	50	4	4

(Angola(2)ctd.)	A	B	C
19. St.Antonio de Zaire	50	8	4
Union of South Africa (3)			
1. Cape Town	24	-	0
2. Durban	25	-	0
3. Tongaland	42	-	0
Bechuanaland (3)			
1. Serowe	13	-	0
Southern Rhodesia (3)			
1. District of Mtoko	22	-	0
Northern Rhodesia (3)			
1. Barotseland	21	-	0
2. East Luangwa	25	-	4
3. Northwest District	25	-	0
4. West Luangwa	25	-	4
Madagascar (3)			
1. Tananarivo	20	-	0
Zanzibar (3)			
1. Zanzibar	62	-	0
Tanganyika (3)			
1. Bukoba	23	-	3
2. Dar es Salam	25	-	0
3. Kigoma	25	-	0
4. Mpapwa	25	-	0
5. Mwanza	25	-	4
6. Tabora	23	-	0
7. Tinde	23	-	0
8. Uzinza	25	-	0
Kenya (3)			
1. Fort Hall	26	-	0
2. Kakamega	55	-	0
3. Kisii	25	-	4
4. Kisumu	42	-	0
Uganda (3)			
1. Ajumani	46	0	0
2. Aringa	51	0	0
3. Arua	92	0	6
4. Fort Portal	21	-	10
5. Gulu	51	0	0
6. Kaiso	19	0	0
7. Kigezi	24	-	8
8. Kitgum	50	0	10
9. Lira	54	0	3

(Uganda(3)ctd.)	A	B	C
10. Masindi	50	4	0
11. Moyo	51	0	3
12. Mugwer	51	0	4
Anglo-Egyptian Sudan (3)			
1. Amadi	36	0	11
2. Dilling	45	0	23
3. El Fasher	38	0	45
4. El Obeid	52	0	0
5. Geneida	38	0	8
6. Juba	52	14	7
7. Khartoum	32	-	0
8. Li Rangou	31	0	25
9. Malakal	50	0	4
10. Rumbek	61	4	46
11. Wau	55	13	26
12. Yirol	19	0	-
13. Yubo	37	0	25
14. Zalingi	30	0	13
Anglo-Egyptian Sudan (9)			
15. Kau	38	42	87
16. Eliri	27	0	58
Anglo-Egyptian Sudan (9)			
17. Lafufa	18	0	36
18. Nyaro	5	0	60
19. Heiban	31	0	7
20. Gulfan	99	0	18
Anglo-Egyptian Sudan (7)			
21. Malakal	114	18	19
Anglo-Egyptian Sudan (10)			
22. Wadi Medani	3	-	0
23. Kosti	26	-	4
Egypt (3)			
1. Aswan	28	-	0
2. Asyut	48	-	4
3. Luxor	51	-	0
4. Mansura	110	0	1
Abyssinia (3)			
1. Addis Abeba	27	-	0
British Somaliland (3)			
1. Berbera	10	-	0
2. Burao	19	-	0
3. Hatgeisa	15	-	0

(Note to Table II:)

Source material (figures in brackets behind the names of regions): 1 = BEEUWKES and MAHAFFY, Transact. Roy. Soc. Trop. Med. a. Hyg. 28, 39 (1934). 2 =BEEUWKES, MAHAFFY, and PAUL, ibidem 28, 233 (1934). 3 = SAWYER and WHITEMAN, ibidem 29, 397 (1936). 4 = BOYE (Stefanopoulo). Bull. Off. Internat. Hyg. Publ. 25, 1015 (1933) and 26, 2106 (1934). 6 = STEFANOPOULO, "Rapport preliminaire sur les resultats du text de seroprotection en A.E.F. (1935-36)", in the files of the French Colonial Ministry. 7 = FINDLAY, Acta conventus III de tropicis morbis 1938, 314. 8 = JAMES, Bull. Off. Internat. Hyg. Publ. 27, 2354 (1935). 9 = KIRK, ibidem 28, 2343 (1936). 10 = JAMES, ibidem 26, 1043 (1934).

The distribution of the principal vector, Aedes aegypti (Stegomyia), extends much farther than that of yellow fever, it practically occurs in the whole tropical and subtropical zone of the globe and even far in the temperate zone, especially everywhere in the Mediterranean region, in the Near East and in all southern Asia, also on the East African coast (see map II/3 and VII/8).

On the other hand, as far as one knows by now, one finds Aedes aegypti everywhere in Africa where immunity of yellow fever is found. The gnat is there by no means limited to the regions of the coast and of the large rivers, but it is found for instance in the whole of West Africa to the southern edge of the desert in nearly all denser human settlements, in the Congo in large numbers along the affluents up to Elisabethville; in the Sudan, it is found not so frequently, but not only on the Nile, but also in many oases, more frequently again in the settlements of Kenya and Tanganyika. It has been now experimentally proven that also other gnats (in part equally of the family of the Aedes, in part also Hemagogues, Sabethines, and perhaps others as well) may transfer the yellow fever virus, and for South America it has been positively proven that yellow fever occurs in regions free from Stegomyias. These are always districts of virgin forest in which individual cases or groups of cases of yellow fever (jungle fever) occurred, as has been proven, the infections took place in the virgin forest. Vectors are the mosquitoes living in the virgin forest. As known today, these infect themselves in monkeys suffering

from yellow fever, with which fatal cases of yellow fever after natural infection are frequent, and with which even spontaneous yellow fever immunity can be occasionally found by means of the mouse protection test. It has not yet been proven, but it is highly probable that these conditions are equally true for Africa.

In South America, jungle fever usually occurs limited to the seasons. It is not yet known where the virus exists in the season which is free from yellow fever. The monkeys susceptible to yellow fever cannot be this virus reservoir, since those, if infected, become either immune or die, like man; thus, they never become carriers of virus. The virus reservoir is probably in lower mammals (half-monkeys), perhaps even in cold-blooded animals. It is possible that the remarkable limitation of yellow fever distribution despite the by far larger distribution of the vectors and the presence of multitudes of susceptible men, and particularly the humanity of the East African and Asiatic coastal districts is explained by the absence of the still unknown virus reservoir in these regions.

This partial question excepted, one is today better informed of the distribution and dynamics, and thus of the danger, of yellow fever than of most of the other epidemics, as shown by the map.

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DENSITY OF POPULATION IN THE COUNTRIES OF THE ATLAS MOUNTAINS

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Technical Section (Medical)

Through history and colonization the Atlas countries are the African foreland of Europe. The Atlas mountains extending over a stretch of 2,200 Km. from the Atlantic Ocean to the straits between Tunisia and Sicily attracts the rainfalls and stores the water and thus it provides the basin of the rich culture of the thin northwestern strip of Africa. The pictures chiseled in stone, the dolmens, the mural paintings of the prehistoric era, as well as the magnificent Roman ruins give knowledge of the dense population of this territory and of the thousands of years old union of the Atlas countries with Europe which entered a new stage of development when the French set foot in Algeria in 1830, in Tunisia in 1881, and in Morocco in 1907.

The presentation of the density of population was made according to the same principles as for map II/9 "Density of Population in the Near and Middle East". The boundaries of the density of settlement exceeding 1 person per 1 sq.Km. are congruent with the borderline for the precipitation of 125 mm. per year, the denser settlement exceeding 10 persons per 1 sq.Km. is associated to a high degree with the precipitation value of 250 mm.

I. Tunisia

Among the Atlas countries Tunisia, extending over an area of 135,130 sq.Km., is the smallest. The census of 8 March 1936 revealed a total population of 2.6 million inhabitants. The mean density of settlement amounts to 21 persons per 1 sq.Km. and it is higher than that of Morocco (15.6), but it is smaller than that of Algeria (31.4). If one disregards the very thinly populated military area in the south (46,000 sq.Km.) a mean density of population of 28 persons per 1 sq.Km. was found in the northern territories under civil administration. The principal part of the population in the north is assembled in the area around Tunis, in the Medjer valley, and in the Sahel area between Sousse and Sfax. The three regions of Bizerta, Tunis, and Le Kef encompass only one sixth of the land area, but as the most important economic territory they harbor almost half of the total population. 24 % of the population are apportioned to the region of Sousse, 21 % to the region of Sfax, two fifth of this figure to the zone of olive cultivation.

Population of the various regions 1936	Total	Mohammedans	Europeans Total	French	Italians	Jews
Total area	2,608,313	2,335,623	213,205	108,068	94,289	59,485
Bizerte	392,293	356,951	32,126	21,115	10,332	3,216
Tunis	541,828	364,031	143,161	63,027	72,398	34,636
Le Kef	306,409	296,208	8,879	5,170	3,386	1,322
Sousse	630,922	612,006	13,290	8,280	4,328	5,626
Sfax	543,741	516,871	14,994	9,881	3,790	11,876
Southern Military area	193,120	189,556	755	595	55	2,809

In the steppe areas of central and southern Tunisia a denser population is found only in the vicinity of Kairouan, in the region of the phosphate mines near Gafsa and Tela, and in the fertile date palm oases among which that of Gafsa, Tozeur, Nefta, El-Hamman, Kebili, and Gabes, and the island of Djerba are the most important. In places where the irrigation system is sufficient, an intensive horticulture is maintained.

The cultivation of the total areas is as follows:

Cultivated land	2,934,000	hectare
Permanent pasture	100,000	"
Arborous and bush cultures (olives, wine)	630,000	"
Woods and forests	1,016,000	"
Not cultivated but cultivable land	4,320,000	"
Unproductive land	3,500,000	"

The proportion of the Europeans among the total population amounts to 8.2 % (compared with 3.2 % in Morocco and 13.2 % in Algeria). To these 95,000 Jews must be added who, contrary to Algeria, were not granted French citizenship in Tunisia. The European population usually lives in the coastal districts and in the big towns.

The population of Tunisia shows a continuous increase:

Population in	Total	Europeans Total	French	Italians	Maltese	Mohammedans	Jews
1911	1,939,087	148,476	46,044	88,082	11,300	1,740,144	50,467
1921	2,093,939	156,115	54,476	84,799	13,520	1,889,388	48,436
1926	2,159,708	173,281	71,020	89,216	8,396	1,932,184	54,243
1931	2,410,692	195,293	91,427	91,178	8,643	2,159,151	56,248
1936	2,608,313	213,205	108,068	94,289	7,279	2,335,623	59,485

The crucial problem for the policy of population in Tunisia is the proportion of the French population to the Italians 11,200 of whom lived in the country as early as in 1880. As France was not successful in settling a sufficient number of French settlers in Tunisia it at first encouraged the Italian immigration. From 1923 on France made the attempt to correct the statistical facts concerning the population through extensive forced naturalizations of the aliens born in Tunisia which applied particularly to the Italians. Before 1938 the number of the nationalized persons was 31,400, 18,151 of which were Italians. In Italian statistics of 1938 based on the ethnic origin the number of Italians and of Maltese to be counted with them was given as 127,000, that of the genuine French as 73,000 only. Above all attention must be paid to the fact that the Italian part of the population consists principally of peasants, fishermen, manufacturers, and industrial workers; without the Italian laborers the development of the Tunisian mining industry would have been unthinkable.

Occupational classification of the French and Italians in 1938	French	Italians
Peasants and fishermen	9,241	19,750
Tradesmen and clerks	15,362	14,406
Manufacturers and workers	20,760	48,552
Transportation business	10,753	5,888
Independent occupations	4,057	2,881
Officials	21,350	541
Pensioners	6,157	1,033

More than three quarters of the Italians live in the district of Tunis. The city of Tunis itself has more Italian (50,000) than French (43,000) inhabitants even according to the French statistics (1936).

II. Algeria

While Tunisia and Morocco were under the administration of the Ministry of Foreign Affairs as French Protectorates, Algeria was considered as attached to France and was under the authority of the Ministry of the Interior. A large flow of farming settlers from southern France gave a French appearance to large stretches of the country.

Including the southern territory extending through the Sahara to the border of the Sudan, Algeria covers a total area of 2,204,864 sq.Km. with a total population of 7,234,684 persons (8 March 1936). In a narrower sense, Algeria comprises only the northern territories with 209,636 sq.Km. and a population of 6,592,033 inhabitants. The mean density of population is 31.4 persons per 1 sq.Km. and in Africa Algeria is only surpassed by the arable areas of Egypt and the Southafrican Union (34.9).

Departement	sq.Km.	Europeans	Indig.	Total	1 sqKm.
Algiers	54,701	365,504	1,875,407	2,270,911	41
Oran	67,352	399,674	1,223,682	1,623,356	24
Constantine	87,582	213,119	2,514,647	2,727,766	31
Northern areas	209,635	978,297	5,613,736	6,592,033	31
Ain Sefra	650,151	5,393	187,954	193,347	0.3
Ghardja	143,712	2,134	169,232	166,366	1.2
Touggourt	134,865	865	242,498	243,363	1.8
Saham	1,066,500	563	39,012	39,573	0.03
Southern areas	1,995,288	8,955	633,696	642,651	0.3
Algeria total	2,204,863	987,252	6,247,432	7,234,684	3.3

By far the most densely populated area is the coastal zone of the Tell-Atlas. Between Algiers and Constantine the mean density of population is 50 to 100 persons per 1 sq.Km. This figure is increased in the Kabyl territory, the principal retreat of the Berbers, to high above 100 persons per sq.Km. The Algerian plateau located on that side of the Tell-Atlas, where no rain falls, has a width of 60 to 200 Km. This area has a steppe vegetation where halfa grass is cultivated and where cattle-breeding is highly developed.

6.2 million out of the total of 7.2 million inhabitants were "indigenes" without full civic rights ("sujets francais" - French subjects). The number of French citizens, including the native naturalized Jews of Algiers and the aliens, amounted to 890,000; 791,000 of them were of French ethnic origin. In Algiers too the French administration made the attempt to keep the number of the aliens as low as possible through extensive naturalization; the high proportion of Spaniards is also worthy of note.

Population	Total	Frenchmen	Naturalized Jews	Indigens (Sujets francais)
1901	4,739,331	364,257	57,132	4,072,089
1906	5,231,850	449,420	64,645	4,447,149
1911	5,563,828	492,660	70,271	4,711,276
1921	5,804,275	528,642	73,967	4,890,756
1926	6,066,380	657,641		5,115,980
1931	6,553,451	733,242		5,548,236
1936	7,234,684	819,455		6,160,176

Population	Aliens				
	Tunisians	Moroccans	Spaniards	Italians	Others
1901	2,394	23,872	155,265	38,791	25,531
1906	3,083	25,277	117,475	33,153	17,849
1911	2,375	23,115	135,150	36,795	20,927
1921	1,700	27,345	144,315	31,927	15,904
1926	1,308	32,492	135,032	28,594	13,068
1931	2,918	33,840	109,821	26,136	15,705
1936	2,542	36,824	92,377	21,009	14,233

The considerable increase of the population which in the period between 1901 and 1936 annually amounted to 12 per mille of the mean figure for the population on an average, is principally due to a relatively high birth surplus. With a birth rate of about 34 per mille the mortality is only 15 per mille, so that there is an annual surplus of about 100,000 inhabitants.

The total area of 220,486,418 hectare is distributed as follows:

Cultivated land	5,766,475	hectare
Arborous and bush cultures	635,159	"
Woods and forests	3,517,277	"
Natural pastures	20,500,000	"
Not cultivated and not cultivable land	210,533,147	"

Through an agricultural reform and through the expansion of the artificial irrigation (law of 18 April 1942) the control of the increasing surplus of the population was attempted. Great dams were planned to enable the irrigation of about 120,000 hectare of fertile soil. This land is to be colonized by new French settlers and indigenous tenants.

In the principal cities of Algiers, Oran, and Constantine nearly 400,000 Europeans are living; 80 % of all Europeans have their residence in the towns. In 1936 the total number of Jews was 116,800 (1.63 % of the total population and 14.9 % of the Europeans).

Departement	Jews	
Algiers	34,572	
including town of Algiers with		25,474
Oran	50,452	
including town of Oran "		25,753
Constantine	25,628	
including town of Constantine "		12,961
Southern territory	6,148	

The economic power and the population of Algeria was an important reserve for the home country with its low birth rate. Therefore the loss of Algeria is distinctly noticed above all as regards the food supply.

III. Morocco

In 1936 the total population of Morocco amounted to 7,181,000 inhabitants. Of these 6,273,000 live in French Morocco and 908,000 in Spanish Morocco including the International Zone of Tangier.

	French Morocco	Spanish Morocco
Indigenes	6,057,000	845,000
including Mohammedans (with 21,000 Mohammedan French subjects from Algeria)	5,896,000	811,000
Jews	161,000	34,000
Europeans	216,000	163,000

A. Tangier Zone: The Zone of Tangier which since 1912 has been under international administration covers an area of 373,000 sq.Km. and has about 60,000 inhabitants (1934).

Of these were	Mohammedans	36,500
	Europeans	16,500
	Jews	7,000

The mean density of population which entirely depends on the 46,270 inhabitants of the town of Tangier, amounted to 161 persons per sq.Km.

B. Spanish Morocco: On an area of 28,000 sq.Km. 795,202 (1934) persons lived in Spanish Morocco. Of these there were:

Europeans	44,400
Jews	12,900

The mean density of population was 28 persons per sq.Km.

C. French Morocco: On an area of 415,000 sq.Km. the census of 8 March 1936 showed 6.3 million persons which is equal to 15 persons per sq.Km. The coastal plain spread along the foot of the Atlas mountains and forming the Sebu basin in the north, enjoys a sufficient number of rainfalls and a fertile black-earth soil; it represents the economic center. In the east it borders on a steppe plateau where the halfa grass grows and which is principally an area of cattle breeding. At the foot of the Atlas mountains the soil gradually changes into a fertile red earth zone which is 30 to 40 Km. wide. Due to the numerous rains in the High Atlas mountains this zone permits agriculture and fruit tree cultures. The northwest slopes of the Atlas mountains are populated by settled peasants whose grain cultures are extended to a considerable altitude.

The foreland of the Atlas mountains with an area of about 190,000 sq.Km. is inhabited by 5.17 million persons, which is about 83 % of the total population. Here, the density of settlement amounts to 27 persons per sq.Km. on an average. The accumulation of the population is highest in the vicinity of Casablanca, Rabat, Mazzagan, Port-Lyautey, and Safi, where the density of settlement ranges between 30 and 50 persons per sq.Km.

In Morocco the economic structure also is almost purely agricultural. The total area of 39,862,700 hectare is distributed as follows:

Cultivated land	7,077,000	hectare
Arborous and bush cultures	193,000	"
Woods and forests	2,600,000	"
Not cultivated arable land	10,250,000	"
Not arable land	19,742,733	"

Mining as the cause of accumulations of the population is of no significance.

Population	Total	Not Moroccan Population			Moroccan Population	
		Frenchmen Citizens	Sujets et Proteges	Aliens	Mohammedans	Jews
1921	3,530,000		77,953		3,368,000	84,302
1926	4,229,146	66,223	8,335	30,154	4,016,882	107,552
1931	5,364,809	115,628	12,549	44,304	5,067,743	124,585
1936						
civ.pop.	6,242,706	139,131	16,438	50,937	5,874.888	161,312
mil.	53,430	15,111	6,369	8,616	23,334	-

The census of 1 March 1941 revealed a population of 7,983,473 persons. The increase of the population since 1936 amounts to about 1.7 million or to 27.6 %; it is considerably higher than the increase of the population during the period from 1931 to 1936 when the increase amounted to 0.9 million (16.5 %). The Moroccan population was increased by about 1.6 million persons, the non-Moroccan population by about 143,000.

The considerable increase of the population results in an increasingly embarrassing shortage of land in the densely populated areas. 1.4 million persons are living in the towns which is almost one sixth (17.5 %) of the total population. Almost one quarter of the total increase of the population in Morocco is due to an increase of the urban population which since 1936 has increased by about 450,000 persons or 42.2 %. This means a proportionally considerably higher increase as compared with the rural population (plus 25.1 %).

		1936			1941		
Casablanca	from	257,430	inhab.	to	454,300	inhab.	(76.5 %)
Oujda	from	34,523	"	to	63,381	"	(83.6 %)
Mogador	from	15,166	"	to	25,666	"	(69,2 %)

The population of Marakech, however, was diminished by 0.5 % which is a sign of the decreasing importance of the Sultan government.

For Spain as well as for France the Atlas countries range among the most valuable possessions. For Europe they are a necessary economic supplement and an important military glacis.

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GEOGRAPHIC INDEX

TO THE

ATLAS OF EPIDEMIOLOGY

Prepared by
U.S. Fleet, U.S. Naval Forces, Germany,
Technical Section (Medical)

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The Index is in alphabetical order, cross-references are made wherever doubt is possible.

In case of colonies, protectorates, or dominions, the mother country is given in brackets and abbreviated, e.g. (Br.).

The spelling was checked in accordance with Goode's School Atlas (Rand McNally & Company, Chicago, 1939).

To give a brief survey of the countries treated in the Atlas of Epidemiology, on pages I & II preceding the Index the individual countries are grouped under the following headings:

Europe — Africa — America

Near & Middle East — Asia & Pacific Ocean

The individual countries quoted are grouped into continents as follows:

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Baltic Countries
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Bulgaria
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Tan T / Seuchen Atlas (Additions to)

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UNITED STATES FLEET
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File: P 3-1(c)
Serial: 260-Med

21 February 1949

From: U. S. Naval Forces, Germany, Office of the Senior U.S.Naval Liaison Officer, EUCOM HQ., Attn.: Technical Section (Medical) APO 403

To: Chief of the Bureau of Medicine and Surgery, Department of the Navy

Via: (1) Technical Officer, U.S.Naval Forces, Germany
(2) Chief of Naval Operations (Op-32-F2)

Subject: Missing Articles from Atlas of Epidemiology, Forwarding of Translations of.

Reference: (a) Ltr. P 3-1(c), Serial 254-Med, dated 15 December 1948 from Senior U.S.Naval Liaison Officer, EUCOM, to Bureau of Medicine and Surgery, Navy Department.

Enclosure: (A) Translations of three articles titled:
Foreword by Dr. Handloser
Introduction by Dr. Zeiss
Medical Cartography and Control of Epidemics by Dr. Zeiss.

1. Forwarded herewith is a copy of Enclosure A which are articles missing from Folio I of the translation of the Atlas of Epidemiology which was forwarded previously by reference (a). A copy of Enclosure A will be forwarded directly to each recipient of reference (a) so it may be inserted in the respective copies and the Atlas will then be complete in so far as it was published.

2. The German texts of these articles became available only recently. It is suggested that they be inserted in the Atlas as previously forwarded just behind the Index of the translation. When this is done, the translation will be complete as it was published by the Medical Services of the German Armed Forces, and will be arranged in the order in which the articles appeared in the original text.

3. The preparation of these translations was done by the translators group of the Technical Section (Medical) which has lately been operating under the administrative supervision of the Senior U. S. Naval Liaison Officer, EUCOM HQ. The editing of the translations is still being supervised by Commander Harry J. Alvis, MC., USN., who was formerly Head, Technical Section (Medical) but who has been in the United States since July 1948.

N. W. Abrahams
N. W. ABRAHAMS,
Captain, U.S.N.
Senior U.S.Naval Liaison Officer.

cc:
(see page 2)

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Page 2 of letter P 3-1(c), Serial 260-Med, dated 20 February 1949 from U.S.Naval Forces, Germany, Office of the Senior U.S.Naval Liaison Officer to BUMED, Navy Dept.

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